TECHNOLOGY UTILIZATION

REQUIRED SYSTEM CHARACTERISTICS, SYSTEM ARCHITECTURE, AND OPERATIONS CONCEPT

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CONTRACT NASW-3774, TASK 4

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FOREWORD

This document has been prepared by Computer Technology Associates, Inc., as a data requirement in performance of contract NASW-3774, Task 4. This report contains discussions of office automation equipment requirements, a system architecture, and an operations concept for the NASA Technology Utilization offices.

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2. Cotton, I.W. and Gottlieb, S.E., "The Evolution of Office Automation Evaluation Methodologies", Journal of Telecommunication Networks, December 1983, pp. 435-444.

3. Computer Technology Associates, Report of Site Visits, Deliverable A002 of NASW-3774, Task 4, December 21, 1984.

1.0 INTRODUCTION

1.1 PURPOSE

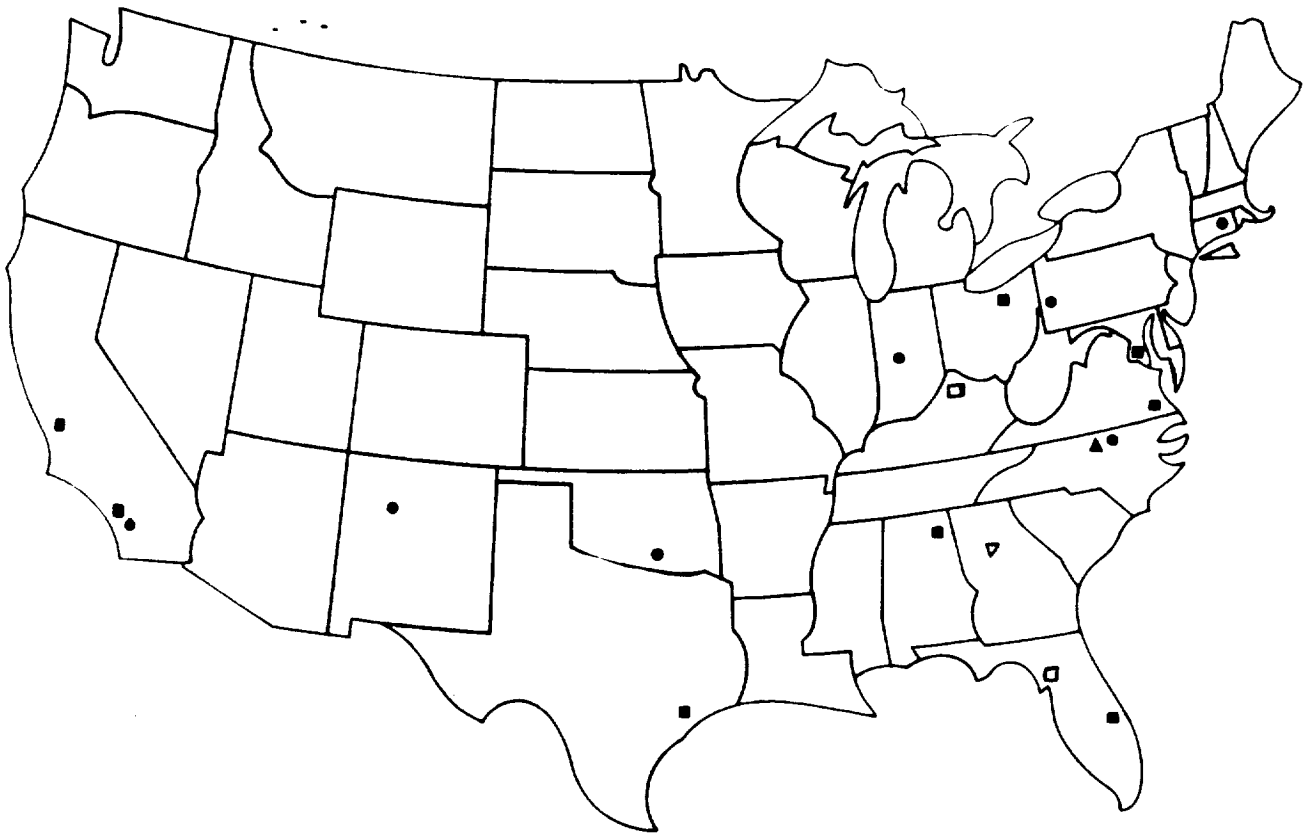
This report documents an analysis of the office automation requirements for the Technology Utilization (TU) offices and describes the architecture of a system that will satisfy those requirements. A standard approach to office automation studies the relationship between functions and products (Reference 1, 2). We employed this approach by obtaining data which described TU office functions and products, and then analyzed this data to develop required system characteristics, a recommended system architecture, and an operations concept.

1.2 BACKGROUND

NASA generates a wealth of technological information in a wide range of aerospace programs. In 1962 Congress required NASA to make the technology available for non-aerospace applications. The Technology Utilization Program maintains a network of user assistance centers that provide information retrieval services and technical assistance to industrial and government clients. The centers are staffed by scientists, engineers and technology transfer specialists.

The Technology Utilization Program, based at NASA Headquarters in Washington, D.C., has offices throughout the United States, serving the nation's primary industrial concentrations. Figure 1-1 shows the locations of the various offices.

The Technology Utilization Program is composed of four types of offices, each with a different mission, as described below.



■ *Field Center Technology Utilization Officers:* manage center participation in regional technology utilization activities.

● *Industrial Applications Centers:* provide information retrieval services and assistance in applying technical information relevant to user needs.

▫ *State Technology Applications Centers:* provide technology transfer services similar to those of the Industrial Applications Centers, but only to state governments and small businesses within the state.

▽ *The Computer Software Management and Information Center (COSMIC):* offers government-developed computer programs adaptable to secondary use.

▲ *Application Team:* works with public agencies and private institutions in applying aerospace technology to solution of public sector problems.

Figure 1-1

TECHNOLOGY UTILIZATION OFFICE LOCATIONS

Field Center Technology Utilization Offices (TUOs) manage the NASA field center's participation in regional technology utilization activities. Each office has a Technology Utilization Officer who is responsible for the identification, reporting, and evaluation of new technology sponsored by or developed at the TU Officer's field center. The TU Officer also arranges for expert assistance in solving technical problems encountered by the TU program. There are nine TUOs, located at the following installations:

Ames Research Center,
Goddard Space Flight Center,
Lyndon B. Johnson Space Center,
John F. Kennedy Space Center,
Langley Research Center,
Lewis Research Center,
George C. Marshall Space Flight Center,
Jet Propulsion Laboratory and
National Space Technology Laboratories.

Industrial Applications Centers (IACs) provide information retrieval services and technical assistance in applying technology to user problems. IACs access and retrieve information from the 1,800,000 technical reports in the NASA RECON data base and from hundreds of other large computerized data bases. IACs perform literature searches in a wide variety of disciplines, and IAC engineers are available to help evaluate the results of the searches. Users of IAC services can arrange to receive periodic current awareness updates on new developments in their areas of interest. There are seven IACs:

Aerospace Research Applications Center, Indianapolis, IN
Kerr Industrial Applications Center, Durant, OK
NASA Industrial Applications Center, Pittsburgh, PA
NASA Industrial Applications Center, Los Angeles, CA
New England Research Applications Center, Storrs, CT

North Carolina Science and Technology Research Center,
Research Triangle Park, NC
Technology Applications Center, Albuquerque, NM

State Technology Applications Centers (STACs) provide the same services on a state-wide bases which the IACs provide regionally. The two STACs are located at the University or Florida and the University of Kentucky.

Special Offices have various missions. The Computer Software Management and Information Center (COSMIC) maintains and sells a vast library of software developed for NASA and other government agencies. Logical Technical Services Corp. publishes the quarterly editions of NASA Tech Briefs. SRI, International evaluates candidate Tech Brief items, assessing their novelty and commercial potential. The NASA Scientific and Technical Information Facility provides library services for a variety of technical reports and maintains the NASA/RECON database. Research Triangle Institute's applications teams work with public and private institutions to apply aerospace technology to public sector problems. The following are special offices:

Computer Software Management and Information Center (COSMIC)
Athens, GA
Logical Technical Services Corp., New York, NY
Research Triangle Institute, Research Triangle Park, NC
SRI, International Menlo Park, CA
NASA Scientific and Technical Information Facility,
Baltimore/Washington International Airport, MD

1.3 BASIS OF ANALYSIS

In conducting our work, we:

- based our analysis on present office functions and sizes,

with allowance for moderate growth in volume of business.

- assumed that the functions of the TU offices were accurately reflected in the survey form responses and interviews. We compared all responses for consistency and neither sought nor used information obtained outside the TU offices.

- did not employ time and motion studies or conduct direct observation of office procedures.

- assumed that the office functions are necessary and adequate as presently performed. We did not consider office reorganizations.

- considered potential porductivity gains in a qualitative sense only.

1.4 METHOD OF DATA COLLECTION

Data was collected during visits to selected sites and from responses received from a questionnaire developed for this study.

1.4.1 Site Visits

CTA interviewed personnel at one IAC, two NASA TUOs and one special office. We also visited Lawrence Livermore National Laboratory (LLNL). Although LLNL does not perform normal TU activities, they are developing a Technology Information System which has potential application to NASA TU activities. Complete descriptions of these visits were presented in detail in Report of Site Visits, deliverable A002 (Reference 3).

1.4.2 Questionnaire

The survey questionnaire was the primary source of data for the office automation analysis, supplemented by data gathered on site visits. The questionnaire consisted of a letter from Mr. Royal G. Bivins, Jr. of NASA Headquarters, six forms, and instructions for completing the forms. The forms requested the following information:

Form 1 - General Office Information
Form 2 - Office Functions
Form 3 - Products or Work Items
Form 4 - Problem Areas
Form 5 - Hardware/Software System Configuration
Form 6 - Communication System Configuration

Appendix A contains a copy of the questionnaire and Appendices B1 through B7 contain raw data from the responses.

1.5 METHOD OF ANALYSIS

Figure 1-2, Methodology for Producing a System Architecture, shows the process used to perform the analysis of this task and produce the architecture. Building on information obtained during site visits and from the questionnaire, we developed a description of office functions and products, documented in Section 2. This information was used to develop the required system characteristics, as documented in Section 3.

The office functions and required system characteristics were used to derive the system operational requirements, presented in Section 4. While deriving the operations requirements, the interface between the user and the system was considered. This

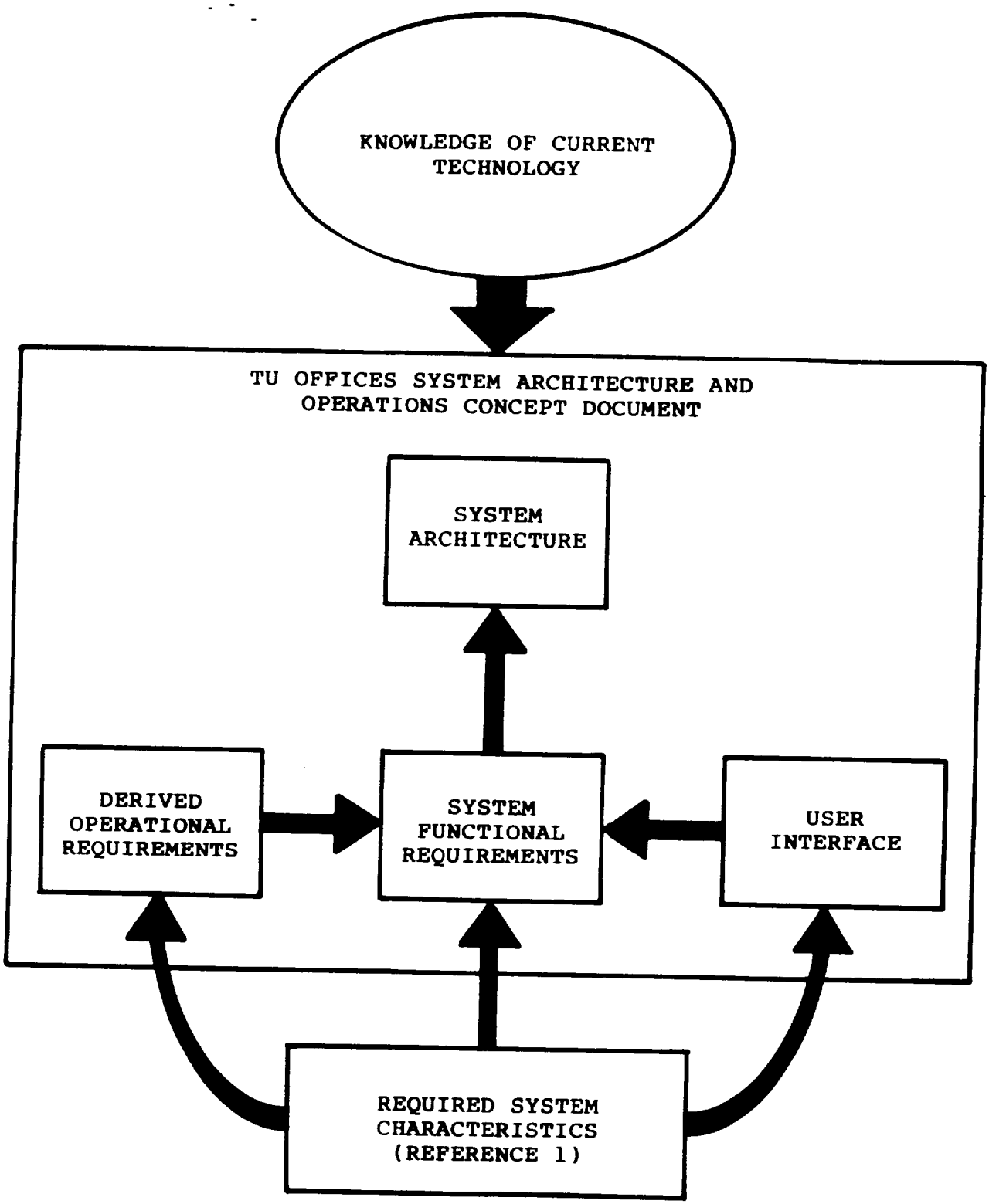


FIGURE 1-2
METHODOLOGY FOR PRODUCING
A SYSTEM ARCHITECTURE

produced a definition of the user interface and a concept of the way that a user will employ the system to perform the office functions and produce the required products. This information is presented in Section 5, User Interface.

Using the derived operational requirements and the definition of the user interface, the material in Sections 2 and 3 was analyzed again to produce system functional requirements, presented in Section 6. As all this information was considered, and as the ideas for the system architecture began to emerge, there were several architectural alternatives which were considered, as documented in Section 7. Finally, all of the information presented in Sections 4, 5, 6, and 7 was used in arriving at the system architecture presented in Section 8. Supporting rationale and selection criteria used in arriving at the system architecture are also included in Section 8.

2.0 KEY FUNCTIONS AND PRODUCTS

In order to define the requirements for automation of TU Offices, the office functions and products (Appendices B2, B3, and B4) were examined in detail. In most organizations a few key functions and products can be associated with the bulk of the work. The products are well understood throughout the organization, sometimes having a common format across the organization. They tend to be static from year to year with only minimal changes. Thus, by studying these products and the functions that produce them, it is possible to determine the requirements for automation (Reference 2).

A key function and product analysis was performed and like products (e.g., monthly and quarterly management reports) were grouped together. The functions were selected because of their frequency of occurrence, importance to the organization, or the possibility of easy improvement. Functions not selected as "key" were those that were relevant to only one office or those that did not qualify in one of the categories above. However, any candidate architecture will be inspected to insure that the requirements for producing all products, not just key products, are satisfied.

Analysis of the functions and products of the TU Offices resulted in grouping the offices into three categories. The functions and products of the IACs and STACs were similar. Thus the analyses for these types of offices were combined. Five of the seven IACs responded to the survey, although only four filled out the forms. New England Research Application Center did not supply data. Both STACs responded to the survey.

Functions of the field office TUOs were similar to each other but quite different from the IACs and STACs. Consequently, the TUOs were analyzed as a group. Six of the eight TUOs responded to the survey. The "special" offices appeared different from the other

types of offices, and, in fact, differed considerably among themselves. It appears that special offices must be treated on an individual basis. For this reason no product analysis was performed for these offices. Analyses contributing to the design of an architecture or series of architectures will not emphasize internal functions within the special offices. The system architecture will, however, consider the needs of "special" offices to communicate with and access information from the other types of offices. Four of the "special" offices responded to the survey.

Separate analyses of the key functions, their inputs, sources of inputs, products and recipients were performed for the IAC/STAC offices and for the Field Center TUOs (Appendices C-1 and C-2). Context diagrams representing data flows among the functions and external sources and sinks are presented in Figures 2-1 to 2-5. The functions of the offices are represented by large ovals. Arrows represent a flow of information from one function to another. Squares represent an external point for the organization or destination of information (i.e., a source or a sink). Ovals constructed of dotted lines represent offpage functions. Definitions of the information flows are shown in Appendix D-1. The Sources and Sinks are described in Appendix D-2.

Information from the context diagrams was combined with data gathered on the site visits. The resulting analysis produced a set of characteristics for the TU system architecture. Section 4.0 describes those characteristics.

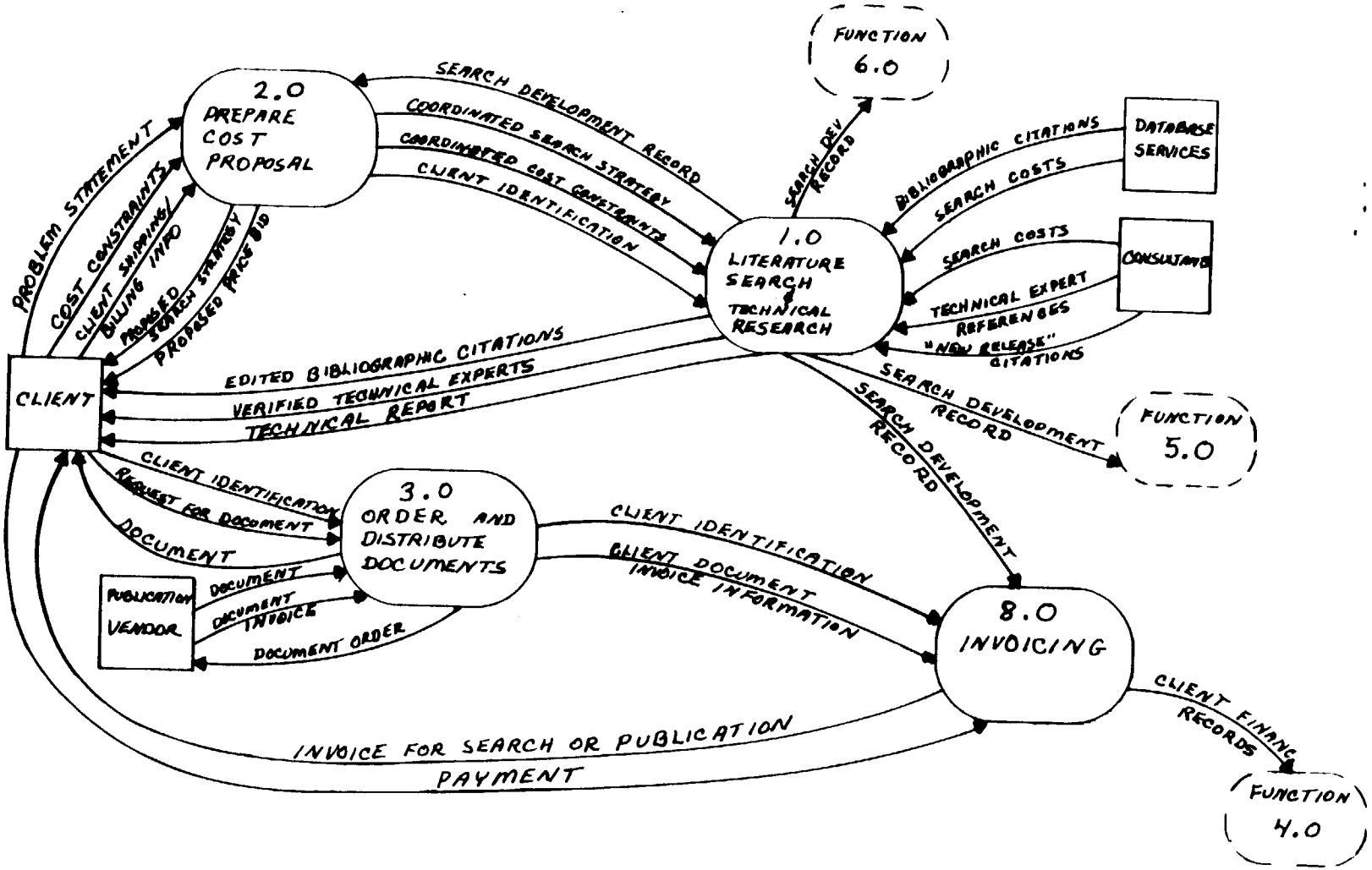


FIGURE 2-1

IAC/STAC OFFICE FUNCTIONS, LEVEL 0

FUNCTIONS 1.0, 2.0, 3.0, 8.0

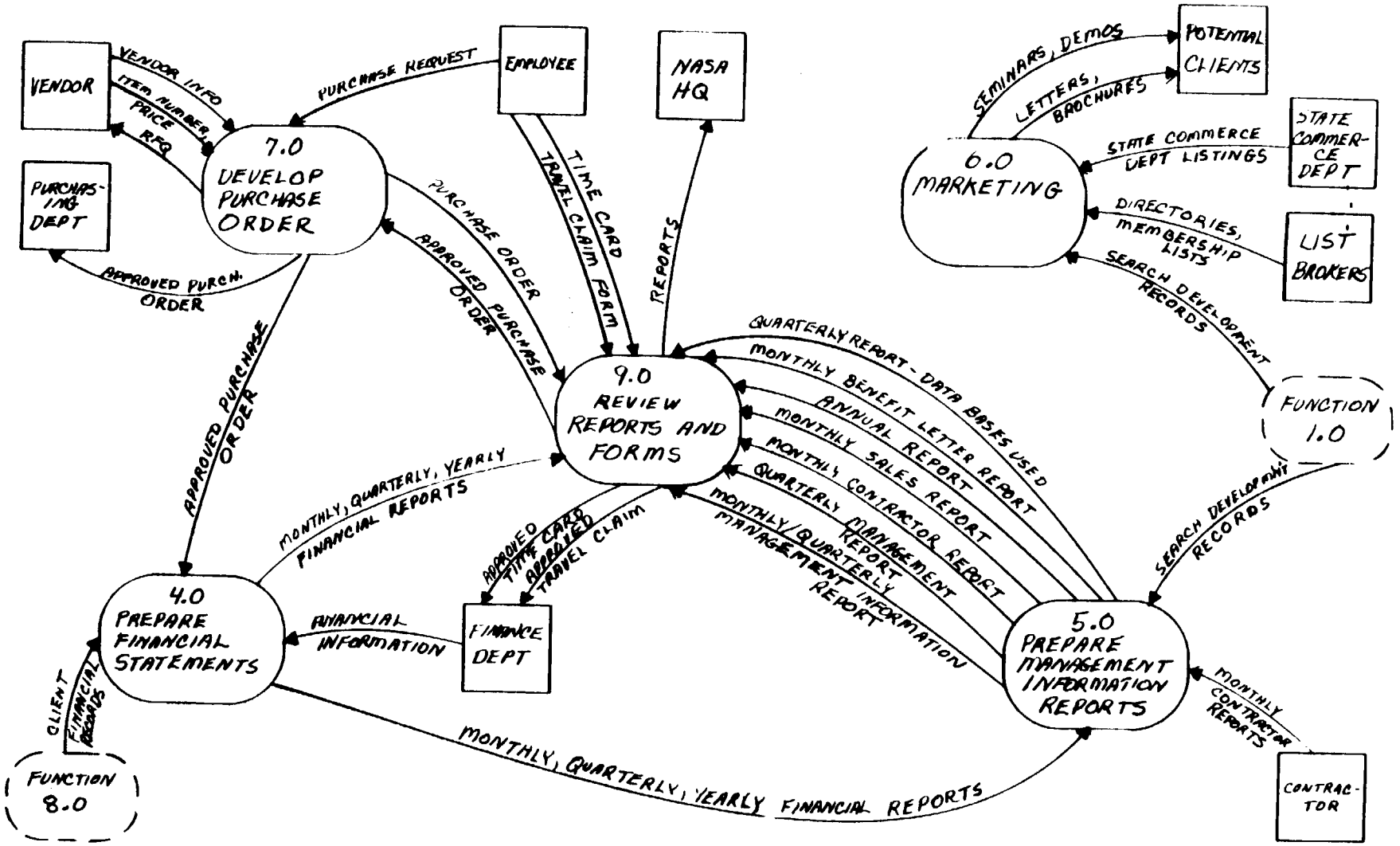


FIGURE 2-2

IAC/STAC OFFICE FUNCTIONS, LEVEL 0

FUNCTIONS 4.0, 5.0, 6.0, 7.0, 9.0

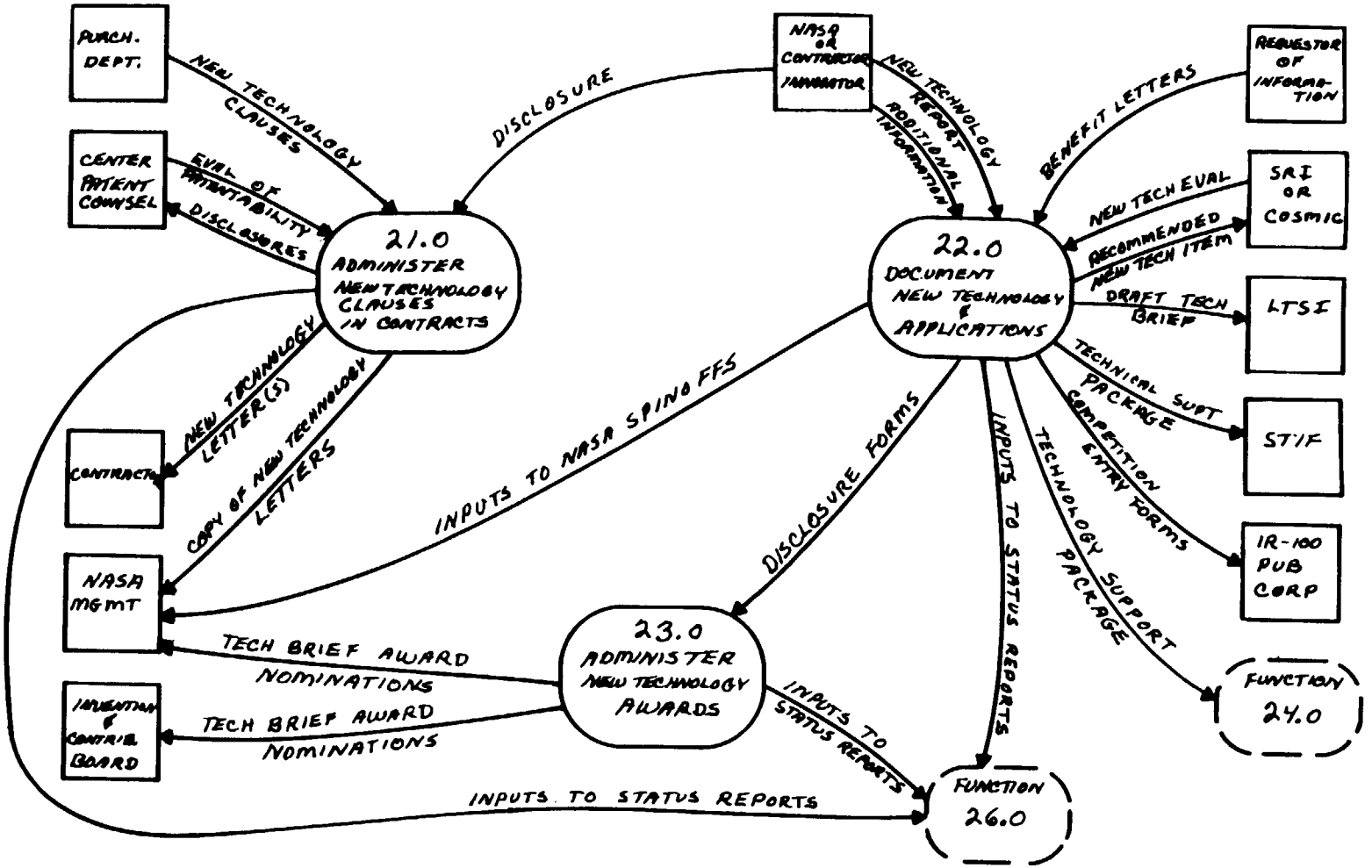


FIGURE 2-3

TUO OFFICE FUNCTIONS, LEVEL 0

FUNCTIONS 21.0, 22.0, 23.0

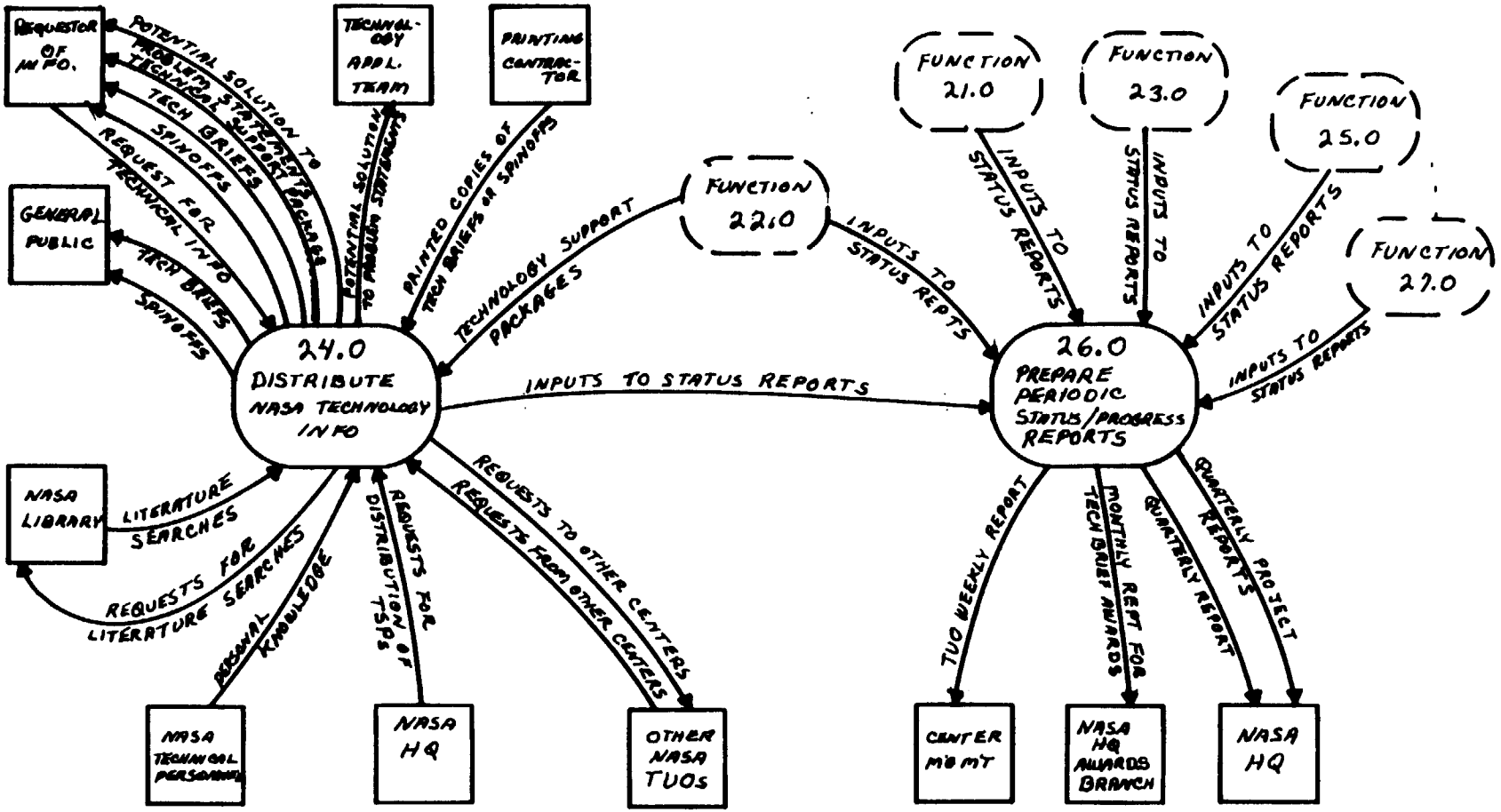


FIGURE 2-4

TUO OFFICE FUNCTIONS, LEVEL 0

FUNCTIONS 24.0, 26.0

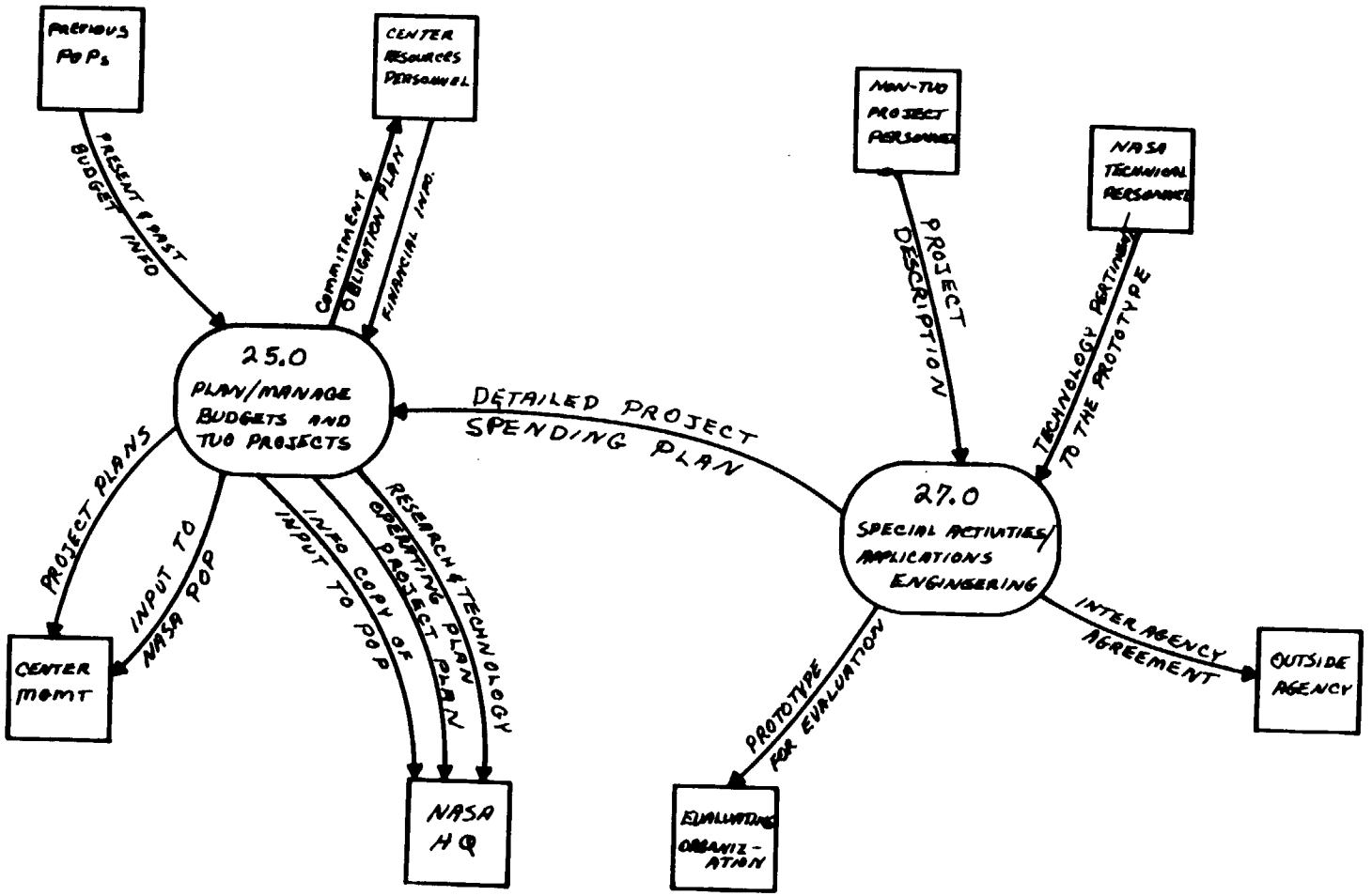


FIGURE 2-5

TUO OFFICE FUNCTIONS, LEVEL 0

FUNCTIONS 25.0, 26.0

3.0 REQUIRED SYSTEM CHARACTERISTICS

This section describes the characteristics of a system necessary to satisfy the functional requirements identified above. The characteristics identified here are purposely stated in general terms to avoid constraining the system architecture unnecessarily. A proposed architecture is documented in Section 9.

The survey and the analysis of survey responses were designed to produce requirements for the key functions to be performed by the TU offices. Many of the required system characteristics were taken directly from the survey; others were implied by functions performed, rather than being explicitly stated. Focusing on key functions is a standard office automation technique that is more effective than spending survey and analysis time dealing with details of system performance, which would be inherent in any well-designed office automation system.

The survey revealed that NASA Field Center TU Offices and the IACs/STACs perform functions which require a system having the following overall capabilities:

- o word processing and forms handling
- o database generation and manipulation
- o communication with other systems
- o manipulation of spreadsheet information
- o output of hard copy

In addition, the IACs/STACs also require these additional capabilities:

- o post-search processing
- o remote display of terminal screen information

Each of these capabilities is discussed in the sections that follow. System requirements which are the direct result of the survey and analysis of the responses are presented first. Additional system requirements follow which represent the professional recommendation of CTA personnel, and are clearly identified as such.

3.1 WORD PROCESSING AND FORMS HANDLING

The system must provide the ability to create and edit text and to enter information on a variety of NASA-standard and local office forms. (CTA recommendations concerning the handling of standard forms are included at the end of this section.) Analysis of the functions performed implies that the system must be capable of handling documents of 50 pages of single-spaced text. Margins must be capable of being set to any column on the page. Page widths up to 14 inches and page lengths up to 13 1/2 inches must be accommodated. The system must provide editing capability for producing programs which can be executed by the system.

CTA recommends that the system provide for optional use of headers and footers, flexible placement of page numbers, and assignment of specific page numbers to specific pages. The on-screen display should show page breaks and clearly show how the printed product will look. The system should provide for operator-selectable use of proportional spacing or microspace justification of text, as well as fixed-size character spaces.

CTA also recommends that software be provided to replace the current system of completing standard forms on a typewriter. In addition, the system should provide for generation of forms by obtaining certain information directly from locally-generated databases. The database features are discussed further in the next section of this report. Such forms could be produced by responding to on-line questions or "fill-in-the-blanks"

techniques. This would require a NASA policy decision to permit use of system-generated forms (produced in a standardized format) in place of pre-printed forms. This capability would allow text editing while preparing forms, obtaining existing information from other database files, and insertion of new information directly on the form. The aggregate effect of these items could produce a significant time savings in typing time required to complete standard forms.

3.2 DATABASE GENERATION AND MANIPULATION

The system must provide the capability to create local databases, allow manipulation of the information, and produce reports, either on-screen or printed on paper as wide as 14 inches. The system must allow query of multiple database files for generation of reports. The system must allow at least 100 fields per record, up to 2000 characters per record, and at least 10,000 records per database file. The system must be capable of obtaining information simultaneously from multiple database files.

CTA recommends that the system be capable of transferring information obtained from database files into a format which is compatible with the word processing and forms handling function. This information should be conveniently transferred to parts of other documents or included on forms being produced by the system. This capability would support the generation of standard forms using information already existing in local databases without the need for retyping.

CTA also recommends that the system provide for variable size fields in a database file. The system should provide the capability of producing reports from at least four database files. The report capability should include the ability to arrange information from different fields, either vertically or horizontally, and allow for conditional selection of information

to be printed. The system should include a programming language or similar capability to permit the execution or complete procedures by issuance of a single instruction.

3.3 COMMUNICATION WITH OTHER SYSTEMS

The system must provide the ability to originate calls to other systems or to answer calls from them. The system shall store telephone numbers, logon sequences, and other system parameters required to accomplish connection to other computer systems. The system shall allow real-time, on-line generation of messages while connected to other systems, and shall allow transfer of text files or binary files.

The system shall be capable of simulating popular "dumb" terminals. The system shall be capable of receiving information from a remote host, displaying the information on the local terminal screen, and optionally printing or storing the received information in a non-volatile form.

CTA recommends that the system employ commonly available error detection protocols, such as XMODEM or KERMIT. The system should provide for alternate transmission of voice and data (using the same telephone connection) or simultaneous transmission of voice and data, as selected by the user. The system should provide for pre-definable capability to transfer selected files at times when the system is unattended, permitting transfer of information when telephone rates are low and offices are not busy with other work. The system should provide a reasonable measure of security to prevent damage to files by a caller executing improper access procedures.

3.4 MANIPULATION OF SPREADSHEET INFORMATION

The system shall provide the ability to generate, edit, and print spreadsheet information.

CTA recommends that the system provide a capability to transfer information from database files to spreadsheet files, and to transfer spreadsheet information to word processor files. This will facilitate the generation of written information containing text and tables. The system also should provide a capability to display output from spreadsheets in graphic form, either on the terminal screen or in printed form. The system should provide for integration of this information into document files for generation of written reports.

3.5 OUTPUT OF HARD COPY

The system shall be capable of producing hard-copy output in the form of high speed (>150 cps) dot matrix print, and slower speed "letter quality" characters of selectable font size and type styles. All hard-copy shall be black on white.

CTA recommends that long-range system planning include high speed printer capability of 300 cps at IACs and STACs to allow for future use of 2400 bits-per-second modems when communicating with commercial databases. CTA also recommends that long-range system planning include X-Y plotters for producing hard copy or graphic output.

3.6 POST-SEARCH PROCESSING

The system provided at the IACs and STACs shall be capable of performing post-search processing of bibliographic citations, using a remote system having the capabilities of the Lawrence Livermore Laboratory "Technology Information System".

CTA recommends that this function be performed on a system such as the Livermore system because it does not appear well-suited to implementation on smaller systems. In addition, the demand for this activity is expected to be small enough that it would not be cost-effective to provide the capability at each IAC or STAC. The possible use of a system such as the Livermore system will be discussed as part of the architecture work to be performed later in this task.

3.7 REMOTE DISPLAY OF SCREEN INFORMATION

The system provided at the IACs and STACs shall be capable of routing the screen information displayed during an on-line search to an additional screen at a remote location. The capability of the USC-developed Remote Interactive Searching System (RISS) or the capability of the Livermore system for remote instruction would provide the required capability.

4.0 DERIVED OPERATIONAL REQUIREMENTS

The operational requirements for the system are derived directly from an analysis of the office functions described in Section 3. The operational requirements are presented here using the same organization of functions as was employed in Section 3, but later sections of this document will show that a single system architecture with minor modifications can be employed for most offices in the family of Industry Assistance Centers (IACs), State Technology Applications Centers (STACs) and NASA Field Center Technology Utilization Offices (TUOs).

4.1 TUO OPERATIONAL REQUIREMENTS

The operational requirements derived in this section bear a direct relationship to the TUO functions described in Section 3. To provide continuity, the same subsection titles are used here as were used in that section.

4.1.1 Administer New Technology Clauses in Contracts

The system must accept, sort and store information relating to NASA contracts which have new technology clauses. (The information stored in each office is required to relate only to the contracts which are administered by the NASA Center where the TUO is located.) Depending on the facility, this information may be obtained by manual input, or by electronic access to an on-center procurement database. The system must support the generation of new technology letters, which can be produced by accessing information in the office database, merging that with "standard" paragraphs, and adding any special text to complete the letter. The system must accept, sort and store information concerning the status of disclosure information received by the TUO.

4.1.2 Document New Technology and Applications

The system must access local office database information or NASA Center information for selected personnel and status information which is placed on various NASA forms associated with the process of documenting NASA new technology. The process of completing these forms involves a mixture of accessing database information and generating descriptive text for integration into the prescribed format of the form. The system must support the generation of multi-page descriptive material which is used to document new technology. The system must accept, sort and store information concerning the status of all new technology actions processed by the local TUO.

4.1.3 Administer New Technology Awards

The system must support the generation of associated forms which are similar in nature and content to the forms discussed in Section 4.1.2, above. The system must maintain information concerning the status of award actions, and produce this information for periodic reports.

4.1.4 Distribute NASA Technology Information

The system must maintain records concerning the status of new technology information produced by the NASA Center where the TUO is located. The system must support the generation or distribution information such as mailing labels and distribution letters. The system must maintain status information relating to special problems being researched by the TUO in response to requests from NASA or the general public.

4.1.5 Plan/Manage Budgets and TUO Projects

The system must provide access to NASA Center budget information if it is maintained in an on-line system. In addition, the system must maintain local records of specific TUO budget items in sufficient detail to permit TUO management of budget costs. The system must provide financial planning and forecasting capabilities to support this budget process. The system must support preparation of budget justifications which are composed of a combination of text and financial numbers. Although this was not mentioned in the survey responses detailed in the appendices, presentation of this numeric information in graphic form as well as numeric form is considered highly desirable.

4.1.6 Prepare Periodic Status/Progress Reports

The system must access local office database information to extract information which will be included in status or progress reports. This information must be integrated with descriptive textual information to produce the completed report. The system must support the electronic transmission of routine progress reports for the required recipients.

4.1.7 Special Activities/Applications Engineering

The system must accept, sort and store information describing the status of special activities or applications engineering projects being supported by the TUO. The system must support the generation of office correspondence associated with these activities.

4.2 IAC/STAC OPERATIONAL REQUIREMENTS

The operational requirements derived in this section are a direct result of the IAC/STAC functions described in Section 3. To provide continuity, the same subsection titles are used here as were used for the functions described in that section.

4.2.1 Literature Search and Technical Research

The system must provide access to bibliographic and related information available from remote on-line databases. It must support the recording of costs and similar data related to each search performed. It must be used to prepare reports summarizing the results of each search. The system becomes the tool of the information technologist to search for and obtain information from on-line systems, analyze the information obtained, organize the information for presentation to the client, and to record information needed later for preparing invoices and summary reports of search activity.

4.2.2 Prepare Cost Proposal

The system must support the preparation of textual and numeric information into proposals for work to be done for clients. The system must maintain a database of information related to the client, the proposed activity and status of any interactions with prospective clients.

4.2.3 Order and Distribute Documents

The system must maintain records of orders, clients placing the orders, and related information. The system must support the

preparation of orders for documents obtained from document vendors.

4.2.4 Prepare Financial Statements

The system must maintain records of client information, essentially the same as that required in paragraphs 4.2.1, 4.2.2, and 4.2.3, for use in preparing financial statements. It must retrieve the cost information concerning the client services, which was entered during literature searches and related research, the ordering of requested documents, and other services for which the client should be billed. The system must manipulate this cost data and prepare inputs to the accounting system for preparing bills sent to the client. In most cases, the accounting system does not reside within the TU office, but is provided by the office's host institution. The system requirements presented here are based on the assumption that there is a separation between the formal accounting system and the office automation system that supports the rest of the office functions.

4.2.5 Prepare Management Information Reports

The system must access local office records to produce summaries of monthly, quarterly, and yearly activity of the office. This information will be both textual and numeric, and will be integrated into the final progress reports. The system must support the writing of textual summaries and facilitate the production of completed progress reports for submission to the recipients. To the extent that NASA and other regulations permit, the system must support the electronic delivery of these reports.

4.2.6 Marketing

The system must accept lists of potential clients; sort, organize and store this information. The system must provide access to this information concerning potential clients when required by the system users. The system must support the production of sales information, such as written text and numeric summaries which describe the benefits of the service to potential clients. The system must provide for demonstrations of the IAC/STAC capabilities to potential clients, and these must be performed at locations outside the local IAC or STAC office.

4.2.7 Develop Purchase Order

The system must support the production of requests for quotations which will be sent out to vendors. The system must accept, sort and store information concerning vendor's prices, etc. The system must support preparation of purchase orders.

4.2.8 Invoicing

The system must support preparation of invoices for submission to the client for services performed. (This function usually involves processing of information which is sent to the host institution for generation of invoices on the institution accounting system.)

4.2.9 Review Reports and Forms

The system must maintain records of the status of reports and forms requiring review. (The review process is a human activity, not a system requirement.)

5.0 USER INTERFACE

This section describes the interface between the system and the users of the system, providing insight into the way the system can be used and into the demands the system will place on the users.

5.1 DEMANDS ON THE USER

The TU office staffs deal with NASA technology but they are not necessarily computer professionals. The system must provide a user interface without demanding that the users become experts in the system hardware and software. Users guides provided with the system, books published by the popular and technical press, and one- to five-day training classes will give the users adequate system knowledge.

5.2 DEMANDS ON THE SYSTEM

Through commercially available application programs, the system will provide a user interface for:

- word processing and forms handling,
- database generation and manipulation,
- communication with other systems, and
- manipulation of spreadsheet information.

Software selected for the system must be chosen with the following criteria as considerations:

- ability to perform the functions described in Section 5,
- compatibility of data files between offices, and
- readily available user support.

Although all functions of the system are not required to be integrated into a single software package, similarity of command syntax and program operational flow between different software packages is highly desirable. The software packages should provide on-line help files and other reminders to aid the user in remembering how to use the program. The packages should not be entirely menu driven, as menu-driven software is notoriously slow and inconvenient for an experienced operator to use.

The system should allow the later incorporation of additional software packages or replacement of individual packages as the need arises. The system also should allow the addition of special applications or software utilities which may be needed by some of the offices.

5.3 SYSTEM OPERATION DESCRIPTION

This section describes the way that TU office personnel will use the system to perform the functions required for each office. The "user's view" of the system is shown in Figure 5-1. The user will be presented with four general capabilities with which almost any task can be performed.

- Text Processing capability,
- Data Management capability,
- Numbers Management and Analysis capability, and
- Communication Interface capability.

A system which provides a broad range of general capabilities can be adapted more easily to perform new tasks as the activities in the TU offices change. The user will employ one or more of these capabilities to perform the tasks to be done. The user will be able to perform operations using the particular subsystem best suited to the task being performed, with the ability to move part or all of the task to another subsystem as the need arises. In

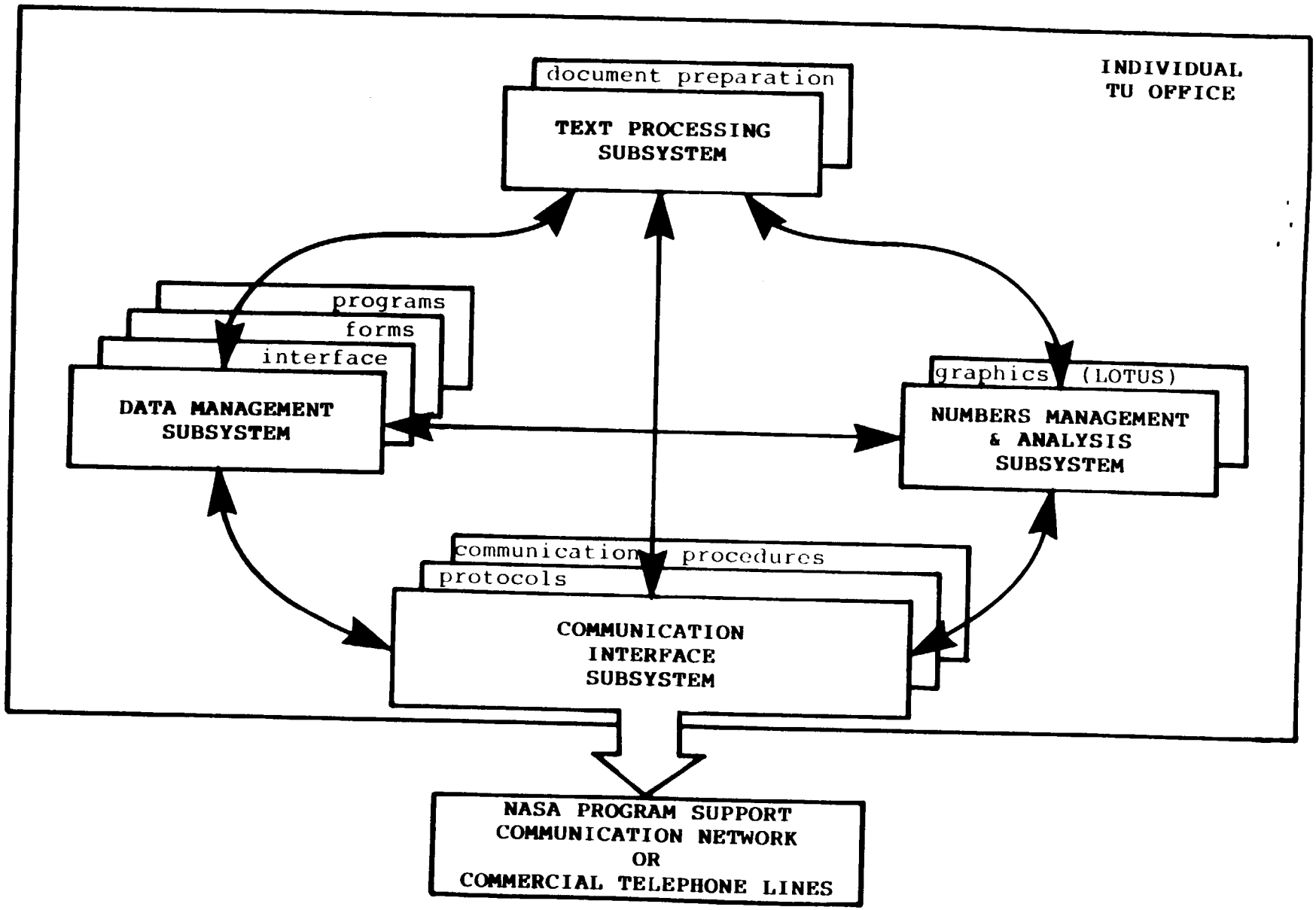


FIGURE 5-1
USER'S VIEW OF THE SYSTEM

addition to the major subsystems, the user will also have access to system utilities which will perform necessary system-management tasks, such as copying of files, creation of system backup tapes or disks, file repair utilities, etc.

The same basic system structure can be used by both the TUOs and the IAC/STACs, with some addition to the communication interface subsystem at the IAC/STACs. The use of the same basic system architecture for all offices will make it easier to pass information, and to develop a more consolidated approach to solving common information-handling problems. This will assist in developing a more efficient interface between Technology Counselors and NASA Center TUOs, for example. The next sections describe the user interface to this common system architecture from the view of the TUO and the IAC/STAC.

5.3.1 TUO User Interface

The TUO user will utilize the system for generation of written material and maintenance of office records. These functions require the user to operate the system as a word processor or a database query device. Documents produced on the system may be generated from handwritten notes, or may be written in draft by the author directly on a terminal of the system. In preparing reports, the user may also obtain information from a database maintained by the office, covering such information as NASA tech briefs published by the office. Depending on the document, the user may print the entire document directly from the database, or may integrate the output of the database and written material prepared by the office wordprocessor.

The TUO user also will use the system to transmit completed files to the recipient. When the file is ready to deliver, the user would call the receiving office to arrange a time when the receiving system will be ready to answer the phone. If there are

several files to be sent, the receiving office may leave the system in answer-mode for an extended period.

The user may employ the system as a terminal for Telemail or the TIS Electronic Mail. The user would use the communication subsystem to call the electronic mail facility in essentially the same manner as calling any of the other places normally contacted by the TUO system. The system will be capable of preparing messages for transmission after connection to the electronic mail capability, or the system can be used with the electronic mail editor to compose and send short messages while connected to the mail system.

The TUO user will utilize the system to maintain status of available TSPs, and to prepare TSP packages for sending to requesters. In this case, the system will be used as a database and as a text processor. Information concerning TSPs requested and sent will be recorded in the data management subsystem.

The TUO user will utilize the data management subsystem, numbers management and analysis subsystem, and the text processing subsystem to generate periodic status reports, and will use the communication subsystem to transmit these reports to the specified recipients.

5.3.2 IAC/STAC User Interfaces

The IAC/STAC user will utilize the system for searching for information required by the client. The system at these offices must support the function of searching Government and database contractors on-line data bases. The user will perform this operation using the communication subsystem in a terminal emulation mode, or will utilize a separate terminal provided to the IAC/STAC for this purpose. Data that is received can be printed as it is received and, at the user's option, can be captured to

disk.

The user has the option of performing this search by a direct telephone connection to the database vendor or by contacting the vendor via the Technology Information System. Either option requires the user to select communication software having terminal emulation capability or to perform the function from a terminal dedicated to on-line searching. After the contact is completed, the user can enter the connect time and associated costs into the database or spreadsheet program used by the office to collect cost information. Finally, the user has the option of performing the on-line search in concert with the client by using the RISS capability developed by the University of Southern California, or by using the "interactive teaching" capability of the TIS.

The IAC/STAC user will enter any appropriate information concerning a completed on-line search into the client records maintained by the office. This information is placed into the database by the user as the work for each client progresses, and is retrieved by the office staff when preparing inputs to invoices or when preparing periodic status reports.

The portable system is used for sales demonstrations at meetings and seminars, where demonstrations of the system operation can be given to potential clients. During the demonstrations, the portable system can be used as either the system calling the on-line database, or as the client system operating remotely from the office using RISS or the "interactive" teaching mode of the TIS.

6.0 SYSTEM FUNCTIONAL AND PERFORMANCE REQUIREMENTS

Derived operational requirements for the TU office automation system were presented in Section 4, Derived Operational Requirements. The requirements presented in that section were organized according to the type of office and the office functional capabilities which were presented in Reference 1. Even though the information in Section 5 was organized in a manner which could result in entirely different systems at TUOs and IAC/STACs, a review of that material shows a striking commonality of required system capability. This sense of system commonality was also evident in the material presented in Section 5, User Interface.

The material in this section is presented to describe a single system which will meet the needs of the TUOs and the basic needs of the IAC/STACs. This basic system can be augmented with added functional capability to meet the full needs of the IAC/STACs. The analysis of functional needs reported in this document cover basic office automation needs and needs for remote searching of on-line databases. Special needs of the TU Applications Teams and of an IAC (such as NAREC) which performs in-house searches of leased databases are significantly different and would probably require a different system. A different analysis of system needs, beyond the scope of this task would be required.

This section presents the functional requirements which the system must satisfy. The section is organized according to the functional subsystems discussed in Section 6, User Interface. In addition to the four functional subsystems, there are requirements such as output of hard copy and general system utilities which affect all system functional capabilities. These are presented in separate subsections. Finally, the functional requirements for post-search processing, remote display of screen information, and a portable system also are discussed in separate subsections.

The material in this section includes items extracted from the system requirements discussed in Section 4. That material has been included here for the convenience of the reader, so that the system requirements resulting from an analysis of the survey responses and the system requirements resulting from the analysis reported in Sections 5 and 6 of this document can be presented in one place.

6.1 WORD PROCESSING AND FORMS HANDLING

The system must provide the ability to create and edit text and to enter information on a variety of NASA-standard and local office forms. (CTA recommendations concerning the handling of standard forms are included at the end of this section.) Analysis of the functions performed implies that the system must be capable of handling documents of 50 pages of single-spaced text. Margins must be capable of being set to any column on the page. Page widths up to 14 inches and page lengths up to 13 1/2 inches must be accommodated. The system must provide editing capability for producing programs which can be executed by the system.

The system word processor/text editor must have the capability of producing ASCII files, as well as files containing the word processor control codes. This will permit preparation of command files for execution by other programs in the system, and permit production of text files which can be sent to other systems not employing the same word processing software.

CTA recommends that the system provide for optional use of headers and footers, flexible placement of page numbers, and assignment of specific page numbers to specific pages. The on-screen display should show page breaks and clearly show how the printed product will look. The system should provide for

operator-selectable use of proportional spacing or microspace justification of text, as well as fixed-size character spaces.

CTA also recommends that NASA allow the TU offices to use system-generated forms in place of filling out preprinted forms on a typewriter. The system should provide the capability of generating these forms by obtaining certain information directly from locally-generated databases and allowing the user to enter other information using the text processor. Such forms could be produced by responding to on-line questions or "fill-in-the-blanks" techniques. The aggregate effect of these items could produce a significant time savings in typing time required to complete standard forms.

6.2 DATABASE GENERATION AND MANIPULATION

The system must provide the capability to create local databases, allow manipulation of the information, and produce outputs, either on-screen or printed on paper for inclusion in written reports. Each office is required to maintain local databases of information developed by the office and used routinely in conducting the office business. Offices are expected to exchange files of this information when the occasion warrants, such as to provide other offices with tables of Technology Support Packages produced by the local TUO.

The system must allow query of multiple database files for generation of reports. The system must allow at least 100 fields per record, up to 2000 characters per record, and at least 10,000 records per database file. The system must be capable of obtaining information simultaneously from multiple database files. These performance requirements will accommodate the requirements of NASA forms reviewed during this task. Use of other forms could result in somewhat different performance requirements.

The system in each office should be capable of performing relational database functions. The rationale for selecting a relational database is that such a database model can be developed and modified more conveniently by users who do not have extensive programming background. All TU offices should utilize the same database architecture and software, allowing offices to exchange database files instead of simply exchanging reports produced by the database. The database software must have the capability of executing user-developed command files, allowing execution of procedures involving several commands without the need to enter each specific command each time the procedure is repeated.

The system must be capable of transferring information obtained from database files into a format which is compatible with the word processing and forms handling function. This information should be conveniently transferred to parts of other documents or included on forms being produced by the system. This capability would support the generation of standard forms using information already existing in local databases, without the need for retyping.

The system should provide for variable size fields in a database file. The system should provide the capability of producing reports from at least four database files. The report capability should include the ability to arrange information from different fields, either vertically or horizontally, and allow for conditional selection of information to be printed. The system should include a programming language or similar capability to permit the execution of complete procedures by issuance of a single instruction.

6.3 COMMUNICATION WITH OTHER SYSTEMS

The system must provide the ability to originate calls to other systems or to answer calls from them. The system shall store telephone numbers, logon sequences, and other system parameters required to accomplish connection to other computer systems. The system shall allow real-time, on-line generation of messages while connected to other systems, and shall allow transfer of ASCII text files or binary files.

The system shall be capable of simulating TTY-type terminals which will interact with the on-line database services. The system shall be capable of receiving information from a remote host, displaying the information on the local terminal screen, and optionally printing or storing the received information in a non-volatile form.

The system shall be capable of sending files to other TU offices using a transfer protocol which employs an error detection mechanism. The system shall be capable of sending or receiving files, and of acting as the remote terminal or the host for such exchanges. The system should provide for capability to transfer selected files at times when the system is unattended, permitting transfer of information when telephone rates are low and offices are not busy with other work. When the system is acting as the host, it shall provide a reasonable measure of security (passwords, etc.) against unwanted callers, and it shall also provide a reasonable measure of security (protection of resident files within the system) against inadvertent damage to the files caused by a caller executing improper access procedures.

TU offices will use NASA Telemail or the Lawrence Livermore Technology Information System Electronic Mail for inter-office messages. Use of this feature requires that the system be capable of initiating calls to the remote hosts (Telemail or TIS) and acting as a TTY terminal. This eliminates the need to

maintain an independent TU office electronic mail system. Use of these existing electronic mail systems also provides the capability to communicate with a large number of NASA personnel outside the immediate TU organization.

6.4 NUMBERS MANAGEMENT AND ANALYSIS

The system shall provide the ability to generate, edit, and print spreadsheet information. The spreadsheet capability will be used to perform forecasting exercises in support of budget preparation and analysis of similar numeric information. The graphics capability of spreadsheets will be used to present graphic representations of numeric information. Spreadsheet information can also be used to track the costs of on-going search activities with the objective of remaining within the client's cost constraints.

6.5 TRANSFER OF DATA BETWEEN DIFFERENT SYSTEM FUNCTIONS

CTA recommends that the system provide a capability to transfer information from database files to spreadsheet files, and to transfer spreadsheet information to word processor files. This will facilitate the generation of written information containing text and tables. The system also should provide a capability to display output from spreadsheets in graphic form, either on the terminal screen or in printed form. The system should provide for integration of this information into document files for generation of written reports.

6.6 OUTPUT OF HARD COPY

The system shall be capable of producing hard-copy output in the form of high speed (>150 cps) dot matrix print, and slower speed

"letter quality" characters of selectable font size and type styles. All hard-copy shall be black on white. CTA recommends that long-range system planning include high speed printer capability of 300 cps at IACs and STACs to allow for future use of 2400 bits-per-second modems when communicating with commercial databases. CTA also recommends that long-range system planning include X-Y plotters for producing hard copy of graphic output.

6.7 STORAGE AND UTILITIES

The system must have the capability of storing all regularly-used programs and data files on-line. The specific storage capacity is difficult to determine, but CTA estimates the required capacity to be in excess of 25 MB and less than 50 MB for most offices. This will provide for on-line maintenance of up to 10 MB of applications programs, 8 to 15 MB of locally generated database and spreadsheet files, and 7 to 25 MB of correspondence and document files. The system must provide a convenient means of producing a backup copy of all data which can be stored off-line. The backup data must be capable of being restored to the system on a selective basis, with selection by the office staff of files to be restored.

All workstations in a multiple-workstation installation must be interconnected so the system capabilities and data files are available to all workstations in the office. This will allow access to commonly used information from any physical location in the local office system, and facilitate passing information between workstation locations.

The system must provide utility programs for management of data files in the system, repair of damaged files, and similar system functions.

6.8 POST-SEARCH PROCESSING

This capability is utilized only by the IAC/STACs. The offices will utilize the capability of the Lawrence Livermore Technology Information System for this function, and it will be performed only with data obtained from Government databases. This restriction is due to copyright regulations covering data obtained from commercial databases. This capability is not provided to each IAC/STAC because post-search processing would require a much larger system than would be needed by the offices to support all other office system functions.

6.9 REMOTE DISPLAY OF SCREEN INFORMATION

This capability is utilized only by the IAC/STACs. It will permit performing a search while the client is viewing the same information displayed on the screen of the information specialist who is performing the search. The client can offer suggestions to the information specialist for optimizing the search, while the TU system is still connected to the on-line database. This can help avoid spending time obtaining information which is of little value to the client. Offices will utilize the Remote Interactive Searching System developed by the University or Southern California, or the Crosslinking of Computer Terminals capability of the Technology Information System. This capability will allow the client of the IAC or STAC to observe the database search while it is being conducted by the IAC or STAC, and to offer verbal suggestions to the searcher for changes which will optimize the results of the search.

6.10 PORTABLE SYSTEM

This capability is utilized only by the IAC/STACs. The portable system demonstrates the remote display of screen information.

This is required to provide an informative sample of the kind of information service a client can obtain from an IAC/STAC. To provide this support, the portable system must include a 1200 baud modem and communications software with terminal emulation.

7.0 ARCHITECTURE CONSIDERATIONS

As part of this task, several architectures were considered. This section describes the different architectures considered, presents the primary pro's and con's associated with each, and draws conclusions which are used as the foundation for the material presented in Section 8, System Architecture. The architectures are described in generic system terms, divorced from any specific vendor identification (though some specific examples are used for illustration, no endorsement of these items is implied). Subsection 7.1 addresses architectures for the aggregate of all TU offices, while subsection 7.2 focuses attention on architectures for individual offices. Finally, subsection 7.3 presents a recommended architecture for the TU offices.

7.1 ARCHITECTURES FOR THE OVERALL TU OFFICE SYSTEM

This section is concerned with the NASA-wide configuration of the aggregate of all TU offices. Since the recommendation of this section is a fully distributed system, with each office having local computer facilities to handle essentially all required functions, no consideration was given to potentially different solutions for the TUOs and IACs/STACs. Three major possibilities exist for this architecture, ranging form a completely centralized system to one that is totally distributed.

7.1.1 Option 1 - A Totally Centralized System

In such an architecture, a high powered, multi user system would be located at a single site, with all TU offices having access to the central system via communication links. In this architecture, individual TU offices would have little, if any computational power of their own.

Two variations of this possible architecture exist: 1) no computational power at the workstation, which would consist of a "dumb terminal", or 2) limited computational power at the workstation, which would consist of a "smart terminal", possibly some type of personal computer. In either case, the individual workstation would have to access the central system to load applications programs and to obtain the data files to be used. In the first case, all activities would have to be conducted with the workstation connected to the central system via a communications link. In the second case, the communication link would not be required during many activities such as keyboard entry or editing.

Benefits

- Effeciently supports distributed authoring of documents or provision of inputs to consolidated reports.
- Single repository for software tools, enhancing standardization and maintainability.
- All offices would have compatible data files, since all would be using the same applications programs.
- Simplifies configuration control of data files.
- Simplifies backup of files.
- Allows for a central support staff with no duplication of effort.

Liabilities

- Potentially reduces system reliability by permitting a single point of failure (would require redundancy in the central system to overcome this).
- Communication costs would be significant, since links from each terminal, or at least from each office would be required on a continuous basis.
- Availability can be a problem if all terminals were being used at once. Shutdown could create catastrophic consequences.

- Performance of the communication links could be a major factor in the overall performance of the system, especially as seen from sites having noisy telephone lines.
- Reaching agreement at all NASA Centers and at all TU offices to use the same equipment might be difficult.
- There are potentially serious political problems in the areas of control (who determines when things that affect performance and availability, such as backups and maintenance, are performed), and support (who determines what gets fixed or upgraded first).

7.1.2 Option 2 - A Clustered System

In this architecture, a number of fairly powerful, multi-user systems would be located at different sites around the country and interconnected via some type of wide area network. This system, although distributed, would be similar in some regards to the centralized system. As with the centralized system, individual workstations could be "dumb" terminals or "smart" workstations.

Benefits

- Supports distributed authoring of documents, but the ease with which this could be done would depend on the implementation of the wide area network.
- Allows software tools and application programs to reside in only a few locations. System software maintenance, while more complicated than for the centralized system, might be possible from a single location.
- Allows for eash sharing of data, since files would be located at a few locations and immediately available to all, and all would be using the same application programs.
- Reliability is improved over the centralized system since there would be no single point of failure.

Liabilities

- Reliability and availability, while better than for the centralized system, is not very good. Depending on the number of workstations attached to one of the regional processors, a large number of users could be inconvenienced by a failure or shutdown of that node.
- Communication costs would be almost as high as for the centralized system.
- Multiple copies of multiuser software would be required, raising system costs and complicating the software maintenance problem.
- Dedicated support staff would be required at each regional node to maintain operational status of the system.
- While not as severe as for the centralized solution, there still would be potential political problems with this option.

7.1.3 Option 3 - A Fully Distributed System

In this architecture, the computational power required for each office would be located at that office. In effect, such a system would consist of a large number of "smart" office systems, interconnected via some type of communication network.

Benefits

- Reliability is increased because of the highly redundant nature of the system. The failure of a single workstation might have a trivial effect on the workflow, since other workstations of comparable capability would be available at that same office.
- Availability is increased because shutdown for things such as backups and maintenance could be performed piecemeal and scheduled appropriatley with the few people affected.
- Communication costs would be reduced significantly, since

communication links would be required only when data was being sent from one office to another.

- The system can be standardized to the point that data files can be exchanged between offices using standardized application programs or conversion utilities. Physical compatibility can be maintained provided workstations conform to standards for the communications backbone, or provided they are interfaced using gateways that conform to the standard.
- The system could be implemented in small segments, keeping initial costs lower than for either a centralized system or a clustered system.
- This architecture tends to be politically acceptable to a larger number of people because it allows control of resources to be placed at each office or each NASA Center.

Liabilities

- Distributed authoring of documents is more difficult, as completed sections would not necessarily be available to any other office.
- Data interchange could be more difficult, depending on the variety of hardware and applications programs employed at each office.
- The procurement of multiple copies of software would require coordination between TU offices, regardless of whether the software were procured as a single purchase or as purchases initiated by each office.
- Operational support would rest primarily in the hands of users in each TU office. Maintenance would be the responsibility of each office, or of each NASA Center.
- Ensuring adequate backup of data files and control of other procedures would be more difficult in a distributed system.

7.1.4 Recommended Option for the Overall TU Office System

After studying the TU offices, the following items are considered to be major factors in selecting an architecture for the TU office system:

- Availability/reliability and ability of the architecture to support the work of each office
- Cost of implementing or upgrading the system
- Cost of operating the system
- Flexibility of the architecture to meet the somewhat different needs of each office
- Self-sufficiency or autonomy of each office

Only a distributed system adequately satisfies each of these items. While a centralized system would have advantages in terms of ease of use and maintainability, these do not overcome its liabilities in other areas. A cluster system would have most of the same liabilities as the central system, while providing little additional benefit. A distributed system would have problems of standardization and exchange of data would be more difficult. However, the distributed system would offer significant advantages for each of the items listed above. Thus, a distributed architecture is recommended.

7.2 ARCHITECTURES FOR AN INDIVIDUAL OFFICE

Within the overall TU office system architecture discussed in Section 7.1, each office also will have an individual architecture. Within a fully distributed system, option 3 as presented in Section 7.1.3, each office could have a centralized system, a clustered system, a distributed system, or a mixture of these architectures. The benefits and liabilities of each possible architecture, as they would apply to an individual office instead of the overall system, are presented in this

section. Possible options have been identified with letters instead of numbers to distinguish the them from the options of Section 7.1

7.2.1 Option A - Centralized Architecture

This option would employ some type of central processor providing computational power for the entire office. Terminals would be provided throughout the office for staff use, but file storage and computational work would be performed by the central system for all users in the office.

Benefits

- Effeciently supports multiple persons working on the same office project.
- Provides a single repository for software tools and applications programs, easing software maintenance or upgrading to new versions of purchased software.
- Provides effortless data transfer between office members.
- Simplifies backup of data files and archiving ot completed projects.
- Conveniently handles tasks requiring a large system, such as searches of leased database tapes (instead of using an online database service) or post-search processing at the IACs and STACs.

Liabilities

- Each office would have a single point of failure unless the central processor employed redundancy.
- System cost for small offices would be very high.
- Most central systems of this type require a full time support staff for operational support, becoming a major cost factor for small offices.
- Expandability and flexibility of the system may be more limited than for other architectural options.

- Availability and responsiveness of the system may be a problem if the office workload increases.

7.2.2 Option B - Cluster Architecture

A cluster architecture would employ multiuser systems interconnected via some type of local area network. In such a system, small groups of office personnel (e.g., 3 to 10) would be supported by a multiuser node and peripheral devices such as printers. Nodes would be replicated throughout the office, based on the number of people, functions performed, and responsiveness required.

Benefits

- Reliability in enhanced because of redundancy, assuming the office is large enough to require multiple clusters.
- Availability, responsiveness and flexibility can be better because of the multiple nodes.
- Incremental delelopment of expansion of the office system is made more convenient than for a system having a single central processor.
- Provides ror easy sharing of peripheral devices, such as printers.

Liabilities

- Compared to the centralized architecure (Section 7.2.1), the following problems are more pronounced:
  - Software licensing and maintenance.
  - Distributed authoring.
  - Transparent data transfer.
  - Data backup and archival.

7.2.3 Option C - Distributed Architecture

This architecture consists of dispersed processing power, in the form of microprocessor-based personal computers. Each of these computers would be dedicated to a single user at a time. In the ultimate, each user would have exclusive access to any and all resources, including such things as high quality printout, plotter output or communication links, needed to accomlish whatever task was being performed. It is more realistic to plan for sharing of expensive or seldom used peripherals, such as plotters and laser printers.

Benefits

- No single point of failure exists. Any failures affect the minimum number of people.
- Availability and responsiveness are increased by providing for a single system per user.
- Flexibility is high.
- Incremental expansion of the system is easy to accomplish.
- This architecture allows each office to be fully in control of its own equipment.

Liabilities

- Software licensing and update are more difficult because of the large number of items required.
- Distributed authoring and transparent data transfer currently are not supported well by commercial software.
- Data backup and archiving become the responsibility of individual users.
- The resources assigned to several users cannot easily be applied to a single problem (e.g., two systems, each having 1 unit of processing power, cannot be combined to produce 2 units of processing power.)

7.2.4 Recommended Option for an Individual Office

After studying the TU offices, there is sufficient diversity between offices that a single architecture cannot optimally satisfy all needs. If cost and size of the office staff were not considerations, option A, a centralized architecture for each office with sufficient redundancy to eliminate single points of failure would be recommended. Such a recommendation should be considered only for the larger offices, those having a staff that would warrant more than 10 or 15 workstations. An office with such a system should include a full-time staff member who would be the system manager.

For offices requiring less than 10 workstations, option C, a distributed architecture of imdividual microcomputers with an interconnecting local area network is recommended. The office would not include a full-time system manager, meaning that control and maintenance of data files would be shared by several staff members. This option offers relatively easy and low cost development of office automation because of low cost for individual elements in the system. In addition, most TU offices already have one or more microcumputers on hand which can be included in such an architecture.

7.3 RECOMMENDED ARCHITECTURE

It is recommended that TU offices be provided with sufficient computational power to accomplish all office functions requiring computer support. This means adoption of option 3 as described in Section 7.1.3. This recommendation should be tempered with the consideration that post-search processing performed by some of the IAC's may require much more computer power than the other functions performed by those offices. It is recommended that such offices utilize the post-search processing capability of the Lawrence Livermore Technology Information System.

The architecture within each office should depend on the size of the office. For most offices, option C as described in Section 7.2.3 is recommended. For the very large offices, option A as described in Section 7.2.1, or some combination of options A and C is recommended. For those offices adopting option C, computational capability should meet all office needs with the possible exception of post-search processing, as discussed in the previous paragraph. This exception is considered because it is not certain that post-serach processing can readily be accomplished in currectly available microcomputers.

8.0 SYSTEM ARCHITECTURE

The TU office functions and system requirements defined in Reference Document 1 are capable of being satisfied by different system architectures. The derived operational requirements, the definition of the user interface, and the system functional requirements, presented in Sections 3, 4 and 5, provide a means of focusing on the specific architecture best suited to the TU office automation system.

The TU office automation system should provide for uniformity of function, where that function is performed at several offices. This promotes coordination between offices. At the same time, the system should allow for diversity of hardware and software, allowing easy interfacing and system support within the host institution. The TU office system requires features of both centralization and office independence. This and similar system-level architecture issues and other considerations which bring the required system architecture into clearer focus are presented in Sections 8.1 and 8.2.

Finally, the proposed system architecture which is the result of this effort is presented in Sections 8.3 and 8.4.

8.1 SYSTEM ARCHITECTURE ISSUES

There are many issues which must be resolved in developing an architecture for the TU office automation system. The significant issues which were considered in the process of this work, and the rationale applied to each, are presented in this section. In addition to providing an insight into the work that was done, this information helps to describe the resulting system architecture. These architecture issues are organized into three descending groups: Major Considerations in Section 8.1.1, System

Architectures in Section 8.1.2, and Office Architectures in Section 8.1.3.

8.1.1 Major Considerations

These issues affect the basic nature of the resulting architecture and therefore require resolution before considering the remaining issues.

8.1.1.1 Locations and Types of Offices

The location and type of offices has a large impact on the potential system architecture. If all offices were in a single geographic location, a fully centralized system, with a central processor, central file storage and terminals in each office could be considered. With dispersed offices, a fully centralized system has two major disadvantages: communications costs would be incurred anytime the system in the office was functioning, and the functionality of each office would be critically dependent on a system over which the individual office had no control. For the TU offices, a decentralized system with processing capability in each office to meet that office's needs is more appropriate.

8.1.1.2 Purchased or Developed System

Consideration was given to whether the TU office system should be made up of purchased, off-the-shelf components or specially-developed items. Specially developed hardware or software offers the potential of being ideally suited to the intended application. It also offers the liability of being expensive to obtain, requiring specialized knowledge to maintain or update in the future, and less flexible in the use of different hardware at different offices. Specially developed items, except for user-

generated software using high-level languages and the RISS interface between the IAC/STACs and clients, are avoided in the proposed architecture.

8.1.1.3 New Technological Capabilities

There are new technological capabilities which can be provided by computer systems which were not included in any requirements obtained during the survey reported in Reference 1. Examples of these capabilities are the use of graphics, facsimile transmission of data, and multitasking functions which require that two or more tasks be performed simultaneously. When thinking of functions performed by people in offices, most people think in terms of single-person, single-task functions. People also tend to think of small computer systems in terms of single-user, single-task systems. Because of the size of many offices, and because of the prevalance of single-user microcomputers already existing in the TU offices, the system architecture should be structured to be capable of evolving from this single-function-at-a-time technology to a more versatile multi-user, multi-function capability. This can be accomplished by using intelligent workstations having local storage capability and the capability of being integrated into a network of workstations supported by a central system which would include file storage and sharing of system resources such as printers.

8.1.1.4 Workload/Response Time and System Growth

No specific requirements concerning system workload or response time emerged from the survey. Developing specific quantitative information for workload and response time would require additional effort beyond the limits of this task order. The system architecture is structured to accommodate modular growth to handle increases in workload. Response time is of secondary

consideration since most of the functions performed will be limited by the factors of human response time, telephone line data capacities, office-type printer capability, etc.

8.1.1.5 System Transition Plan

One of the objectives of this task order has been to produce a system architecture which can be inplemented by a gradual transition from this existing system to the new system. This has produced an emphasis on modularity and compatibility with as much existing equipment as is reasonable. In addition, the system architecture has been considered with a view to implement the existing TU office structures and procedures.

8.1.2 System Architectures

These issues relate to possible architectures for inplementing the overall automation system of all TU offices. These issues deal primarily with interfaces between different offices, inter-office communication, etc. Issues dealing with matters intermal to each TU office are presented in Section 8.1.3.

8.1.2.1 Voice/Data Integration

This issue involves the use of the same communications termination in an individual office for transmission of voice and data at the same time. This may be a desirable approach, depending on the relative cost of terminal equipment and telephone or data lines. At present, there is not a large amount of data communications between offices. Additionally, there is generally one or more telephone terminations per office employee at the present time. The use of integrated voice/data communicatin equipment for microcomputer workstations is just

developing, and the present equipment in the offices does not support this integrated function. It can be incorported in the future by replacement of the present, relatively inexpensive, modems. This capability should be considered as a potential future enhancement.

8.1.2.2 Standardization of Software

Software used by each office has not been standardized at present. Neither the software or the hardware will be transferred between offices, which reduces the need for indeticalness. However, data files generated by word processing, database or spreadsheet software will be interchanged between offices. If offices are cooperating in the writing and editing of a single document, identical word processing software is a requirement. This does not seem to be the case with the TU offices, meaning that files should be capable of being exchanged and printed, with occasional use of exerpts of a file from one office being used in document preparation by another office. Thus, identical word processing software is desirable, but not essential.

Database files may be exchanged between offices and used at the receiving office to generate outputs from the database. This case would require either the use of identical database software, or the use of very reliable database file translation utilities. The system architecture has been based on a requirement to standardize database software at all offices.

Numeric data in spreadsheet files falls sovewhere between word processors and databases. Offices may exchange spreadsheet files, but the more likely interchange is the sending of spreadsheet files to NASA Headquarters as part of periodic reports. In addition, the use of standardized templates on spreadsheets will make the reporting and analysis of numeric

information from each office much easier for NASA Headquarters. In view of this, the architecture is based on the use of a standard spreadsheet.

8.1.2.3 Communications Lines

Data could be transmitted between NASA offices using dialup telephone lines or the NASA Program Support Communications Netwrok (PSCN). At present, the PSCN may not be available to all NASA offices, so those offices should use dialup telephone lines. The Federal Telephone System (FTS) lines can be used, but they may provide poor data quality due to heavy use of the FTS. When the PSCN becomes generally available, it can be used by placing a device called an analog interface between the PSCN and the TUO equipment. The TU office automation system should communicate using Bell 212 protocol and "standard" 1200 bps microcomputer modems at present. In the future, a change can be made to use the PSCN by adding the appropriate interface equipment.

8.1.2.4 Centralized Host

The system could be configured to utilize a few host computer systems for all offices. For example, there could be an east coast host and a west coast host which would support all offices, with terminals and printers located in the offices. This would require the offices to be critically dependent on communications lines and equipment which is remote from the local office. Such an architecture was judged to reduce system reliability for each of the local offices. In the future, a scheme of regional host computers could be considered for performing communications functions and centralized data storage of certain information, but each office should have local computing and support capability to perform all critical office functions. Regional hosts could be a viable alternative if offices were consolidated,

with the regional host being part of a larger regional office.

8.1.2.5 Communication Protocol

There are several alternative protocols for communication between offices. File transfer between offices can utilize one of several error detection protocols, such as KERMIT, XMODEM, or other proprietary protocols offered by microcomputer software vendors. Of these, XMODEM is probably used on more microcomputers than any other protocol. It should be available to the IAC/STACs for use when transferring any files to a client, as the client would be most likely to be able to handle XMODEM. For transfers between offices, the proprietary protocols employed by Microstuf in the Crosstalk XVI program or by Hayes in the Smartcom II program should be employed because those protocols are more effective than XMODEM.

Electronic mail requirements can be satisfied by employing either the TIS or Telemail capabilities for communication between offices. Those systems require only a TTY type of interface, with a modem conforming to Bell 212 standards.

8.1.2.6 Simultaneous Host-Client Interface

This consideration applies only to IAC/STACs. When interfacing simulatneously with a host computer and a client for a remote interactive search, the system should employ a protocol which places a minimum requirement of the client. This means that the simultaneous host-client interface should require the client to provide a TTY-like terminal and modem conforming to Bell 212 standards. This can be satisfied by using either the interactive teaching capability of the TIS or the University of Southern California RISS.

8.1.3 Ofice Architectures

The items included in this section deal with architecture issues which exist within an individual TU office.

8.1.3.1 Centralized vs. Distributed System

The loacl office system could be structured as a centralized system using the Unix operating system to provide multiuser capability, or it could be sturectured as a distributed system with a central server to provide resource sharing ot central files, printers and similar items. For a large office, a centralized system offers a financial advantage because several terminals without file storage or large memory can be used in place of stand-alone workstations. For small otfices, stand-alone workstations connected in a networked arrangement probable offers a tinancial advantage. Several offices already own stand-alone workstations which can be incorporated into a networked system. When all of these items are considered, it appears that a system composed of stand-alone workstations which can be networked together for sharing of central files and printers makes the most sense. The advantages of such an arrangement include not only the capability to acquire the sysem through a series of evolutionary steps, but also the capability for an individual workstation to maintain working files which need not be shared with the rest of the office. In the event of failure of the central unit, individual workstations could be configured temporarily with peripherals which would allow the office work to continue on a reduced scale.

8.1.3.2 Means of Networking Office Workstations

Three methods of networking the office workstations include connecting workstations by means of a Local Area Network (LAN), Private Bell Exchange (PBX) or by point-to-point wiring. Use of point-to-point wiring leads to a cumbersome configuration because each workstation operates as an independent entity, with any file exchange or file sharing requiring use of separate software packages. Communication to the next workstation would be very much like communicating with a separate office. Use of a PBX would require special telephone equipment and there would still be a software problem similar to that encountered with point-to-point wiring.

Use of a LAN permits easy file exchange between workstations in the same office and convenient sharing of printers and similar peripherals. LANs include software which make most of the LAN functions transparent to the user operating the workstation. Most of the LANs readily available operate as a baseband system, with all system elements connected in a bus, ring or star. Of these, the ring has the disadvantage that all system elements must be running in order for any network functions to operate. Use of a bus or star eliminates this problem. Any piece of equipment can be non-functional and all capabilities of the system which do not depend on that piece of equipment can still be utilized.

8.1.3.3 Mass Storage Location

Mass storage for the system can be located entirely at the central hub of each system, it can be distributed entirely among the workstations with no central storage, or it can be a combination of central and distributed storage. An arrangement of central storage of files used by all workstations and storage within the workstation of files used only by that workstation

offers a simple concept of system design. A large part of the work done by each workstation can be accomplished with little demand on the system central unit, while those files and system elements which are shared by all workstations are clearly identified with the central unit.

8.1.3.4 Number of Printers

The number of printers used in each office is related to the size of the office and the demand for printing. In a small office, however, there should be a proportionately larger number of printers to provide for backup in the event of printer failure. Each office should have the capability of printing "letter quality" text, and should also have the capability of printing business graphics such as bar charts and line graphs. Traditionally, these requirements have been satisfied by using two printers, a unit using fully formed letters for letter quality output and a dot-matrix unit for graphics. Printer technology is changing rapidly, and a laser printer is now capable of satisfying both demands. Within the next several months, these units will probably be available at reduced prices and will have software interfaces which will make them very competitive with other letter quality printers. A decision on the specific printers to be purchased for an office should be delayed until the time of placing the purchase order.

8.1.3.5 Redundancy/Backup of Data

Redundancy of data refers to the need for more than one copy of critical information. This is especially true of data which is recorded on magnetic media such as floppy disks or hard disks. The only data which can safely exist in the system as a single file without a copy is data which is not necessary to the functions of the office.

In addition to maintaining more than one copy of important information, prudent system design dictates that data exist on more than one physical unit. This is particularly true of hard disks, which can contain a very large number of files. A failure of the hard disk happens rarely, but such a failure usually results in loss of all data stored on the disk. To protect against this, the system architecture should include a capability to obtain backup copies of system files which can be stored away from the system hardware and restored to the system in case of hard disk or other system failure.

8.1.3.6 Standardization of Workstation Hardware

Standardization of workstation hardware throughout the TU office automation system might appear to be a desirable goal, but it can also be a trap. A rigid requirement for standardization would also mean that the capability of any part of the system would be governed by the capability of the oldest or least capable corresponding element of the system. Any requirement for standardization must be stated in terms of functional compatibility, with provision for new items having greater functional capability than may exist in other existing system elements.

New elements added to the system should be compatible with some basic building block. Since one of the objectives of the TU office automation system architecture is to maximize the system flexibility to include new system elements or new functional capabilities in the future, the basic building block must be chosen to be one which is capable of the required functions, available from a broad base of potential vendors, and can host a large family of software. The family of microcomputers which best meets this requirement at present is considered to be the IBM/PC, XT, AT family. All new system elements should be

compatible with this family.

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8.1.3.7 Phone Lines per Workstation

The number of phone lines required for each workstation depends on the work being performed at that workstation. A workstation used for remote interactive searching would require three phone lines, one tor access to the on-line database, one for connection to the client's terminal, and one for voice communication with the client. Other workstations which are not used for communication with other offices would require only a voice telephone tor use by the operator. In concept, each workstation can be considered to require two phone lines, one for data and one for voice. Selected workstations at the IAC/STACs would require three lines. Specific selection of the number of lines per workstation should be made sometime betore the time ot installation of the affected workstation.

8.2 SYSTEM-LEVEL DESCRIPTION

The following items describe system-level aspects or the architecture of the TU office automation system. Several of these items nave been developed during the analysis ot requirements, and they are included in the system to support the mission of the TU offices and to improve the effeciency of the offices. In some cases, the information in this section is an amplification or specific implementation of the system considerations discussed as part of the system architecture issues in the previous section.

8.2.1 Type of System

Most ot the TU offices are relatively small units, and they are geographically distributed across the continental United States.

Any system architecture developed for these offices must account for this geographic distribution. The TU ofices represent a unusual system design problem because the offices exist as parts of many different host institutions, and yet the offices must function in association with NASA Headquarters and in association with each other. Any system architecture for these offices must take both considerations into account.

The TU office automation system should employ a distributed system architecture; providing each office with its own system, but enabling the offices to work together in a multi-office network. The rationale for this is that the TU offices have functioned for several years as a confederation of fairly independent entities. From a pragmatic view, the office automation system should support this existing style of operation.

8.2.2 Office Autonomy

The system in each office must be capable of providing the full computing capability required for the basic office functions. This assures office autonomy. Each TU office should be capable of performing all local office functions (those not involving communications with a remote system) without having to rely on hardware located in other offices or other facilities.

Each office is required to maintain local databases of information used routinely by that office. Offices are expected to exchange files when the occasion warrants, such as to provide other TUOs with tables of TSPs produced by each office. The rationale for requiring each office to maintain routinely-used information is partly a product of the concept of office autonomy and partly an assurance that the work performed by each office is related to the mission of that specific office.

8.2.3 Interoffice Communication Capability

File transfer between any two offices can take place using common telephone lines, provided prior arrangements have been made. The system will be capable of communication via standard telephone-line modems, but the telephone modem need not be on-line continuously. When the NASA Program Support Communications Network is available, the system should employ that system for communication between NASA Centers. The rationale for not having a full-time capability for file exchange is because the number of files which will be exchanged between offices is small enough that exclusive dedication of part of the system to communication is not necessary, except when file transfers are expected. This concept is shown in Figure 9-1, Data Communications Involving TU Offices.

Offices will have the capability to transmit files to other locations in either of two forms:

- as an ASCII file, containing only characters which can be printed on any printer or displayed on any terminal; or

- as a binary file, preserving all non-ASCII information and allowing exchange of programs or data files which can be used by the same software at both sending and receiving locations.

This will allow flexibility in exchanging files in a rinal output format, having maximum compatibility with other systems; or exchanging files with systems having the same functional software for further processing at the receiving location.

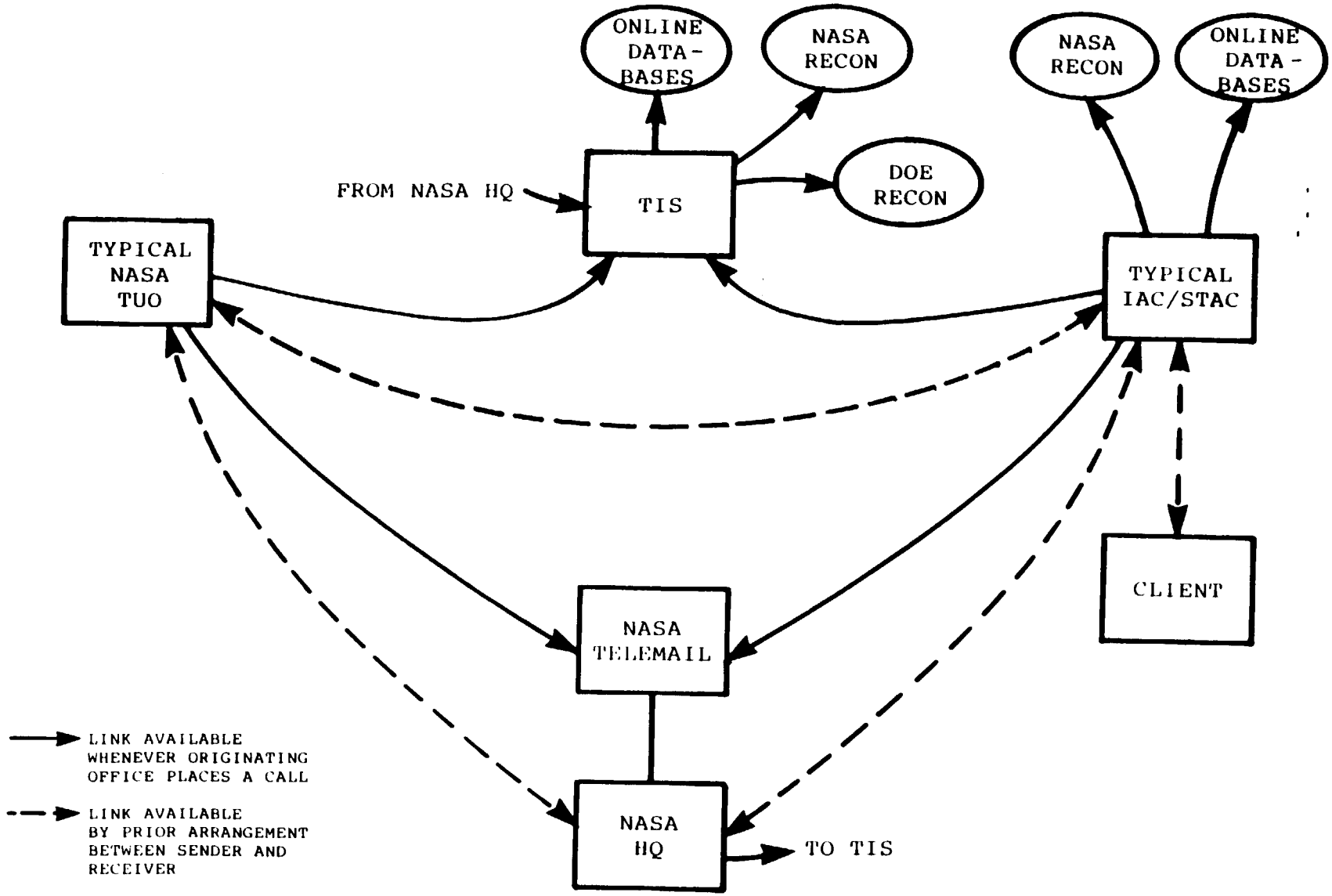

FIGURE 8-1

DATA COMMUNICATIONS INVOLVING TU OFFICES

CTA recommends that the system employ commonly-available error detection protocols, such as XMODEM or KERMIT. XMODEM is commonly available on microcomputer systems, and use of that protocol in the TU office automation system would permit protocol file exchanges with a great number of persons outside the system. In addition, a more sophisticated protocol taking advantage of the capabilities offered by the IBM/PC family should also be employed for greater reliability of file exchange between TU offices.

The system should provide for alternate transmission of voice and data (using the same telephone connection) or simultaneous transmission of voice and data, as selected by the user. The system should provide for capability to transfer selected files at times when the system is unattended, permitting transfer of information when telephone rates are low and offices are not busy with other work. The system should provide a reasonable measure of security to prevent damage to files by a caller executing improper access procedures.

8.2.4 System Complexity

The systems used at most TU offices will be relatively simple systems which will not require continuing support by data processing professionals. The system architecture should provide for system simplicity and be designed to allow modular growth to accommodate any increase in office functions or size. Large offices such as NERAC, where staff size and system usage warrants use of more complex systems and a support staff of data processing professionals, are an exception to this criterion.

8.2.5 System Redundancy

The system configuration of each office will be arranged to promote redundancy. System elements located at a specific office shuld be chosen to minimize the different types of hardware items. This will minimize the possibility of loss of office functional capability due to temporary failure of a single piece of hardware. Although some offices may have a system without redundancy of all components, this will be a consideration in selecting the number and functional capacity of system elements provided to each office. The objective is to equip each office with a sufficient quantity of system components so that critical office functions are not stopped by failure of a single system component.

8.2.6 Storage Capacity

The system at small offices will have the capability to store approximately 20MB of information on-line for access by office personnel. The capacity at larger offices will be greater than 50 MB. This capacity will be used for locally-generated files and files received from other offices. This storage capacity is not intended to include requirements for storage of database files obtained from commercial database vendors, which would apply only to those IAC/STACs which lease databases.

The system in each office will have the ability to produce backup recordings of all data maintained in the system. These backup recordings will be removable from the system so that the data will be protected in the event of a system failure. Data from the backup recordings can be restored to the system on a selective basis, restoring a single file or several files.

8.2.7 System Standardization

Use of identical hardware by all offices is not considered essential because hardware is not expected to be shifted between offices, and the repair of equipment will be performed locally. The use of functionally identical software for the same functions performed by different offices is considered very desirable because the experience of one office with a particular software package can benefit the other offices, and it is easier to exchange files between offices which use functionally identical software.

New hardware acquired for TU offices should be compatible with the IBM/PC, IBM/XT, or the IBM/AT microcomputers. No single choice of hardware can be made which would be fully compatible with all existing hardware in the TU offices. The IBM family of microcomputers is chosen because it is capable of supporting all operations required by the TU offices, the application software available from IBM and other vendors for this family of computers is very large and is still growing rapidly, and it is compatible with the hardware that exists at several offices. This availability of software increases the likelihood that future needs of the TU offices for office automation functions can be accommodated by purchase of commercially available software packages.

For those offices having incompatible hardware, there will be a reduced level of compatibility with the rest of the TU offices. Software having the same functional capability can be used in some cases, but accommodation of future system capabilities as the office functions mature may be difficult or impossible. Even with these potential incompatibilities, these offices should still have the capability of exchanging reports produced by the system in ASCII format.

8.3 BASIC STRUCTURE OF OFFICE SYSTEM

The basic system will support the needs of both TUOs and IAC/STACs, and perhaps the office automation needs of the Application Teams as well. (A detailed consideration of the needs of each Applications Team office was not included in this study.) The actual configuration of the system at each office may differ from this standard architecture because of distinctive requirements of the individual office or host institution. The standard architecture will allow flexibility in system design where necessary, while preventing unnecessary variations between systems at each office. Use of this approach will allow desirable flexibility in achieving a system configuration at each office which conforms to the needs of the "network" of TU offices, while also allowing consideration for the distinctive needs of each office.

Figure 8-2, Basic System for All TU Offices, shows the standard architecture for TUOs and IAC/STACs. In this system, the number of workstations depends on the size of the office. The system has the growth capability to expand to provide one workstation per person in the office. Each workstation will be capable of functioning as an independent computer having internal storage capability. A typical workstation would have one floppy disk and a hard disk. At least one workstation in the office will be capable of being directly connected to the office printers to produce printed output in case of failure of the file server. The workstations and the file server are interconnected by a baseband local area network.

One or more workstations will be connected to a telephone modem, at least one of which will be connected to a dedicated line to handle calls coming into the system. (Placing the computer in auto-answer on a line normally used for incoming calls creates problems when the computer answers a human caller.) Depending on the office, the telephone line may be connected to commercial

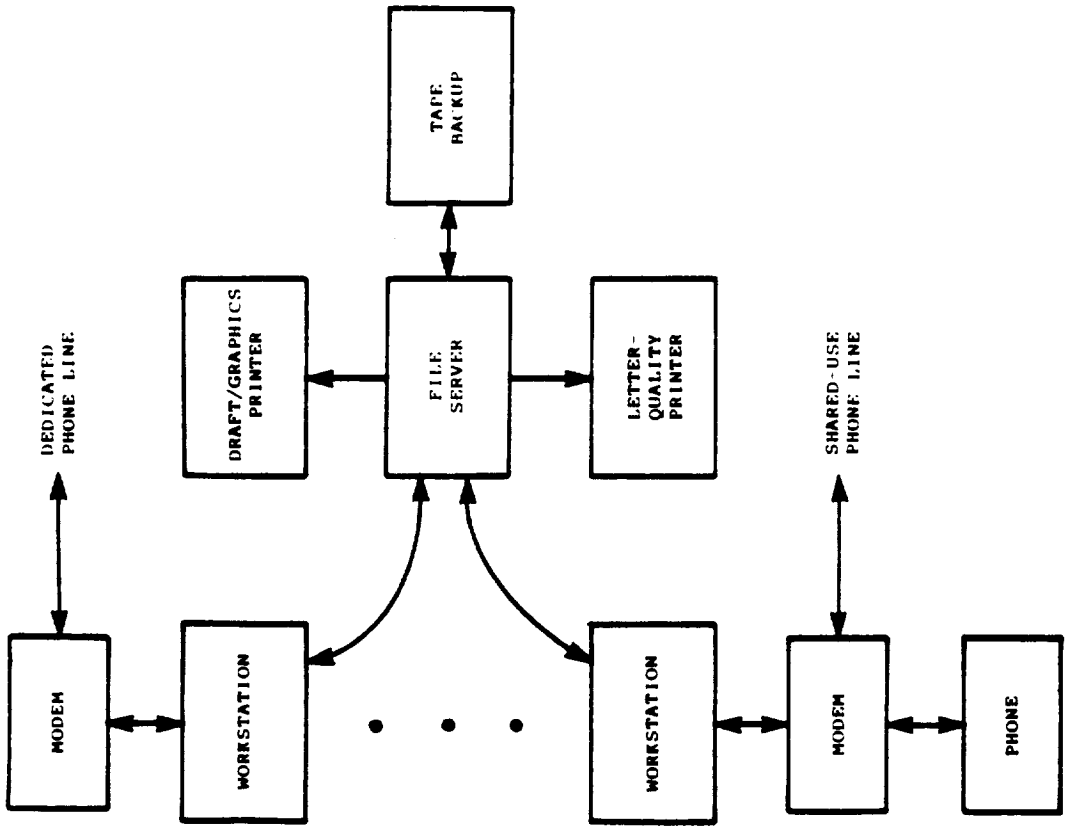

FIGURE 8-2

BASIC SYSTEM FOR ALL TU OFFICES

lines or the NASA Program Support Communication Network (PSCN). In case of connection to the PSCN, an analog adapter may be needed between the PSCN and the modem.

In the near future, modems will be generally available which will support communication at 2400 bits-per-second. Since these higher speed modems will also support 1200 bits-per-second communication, they should be gradually phased into the TU office network as additional equipment is purchased. Expected data volume does not warrant immediate consideration of replacement of existing equipment just to achieve a doubling of communication speed.

Data links between typical offices are shown in Figure 6-2. The solid lines depict dial-up communications to systems which have an around-the-clock answer mode capability. The dashed lines depict dial-up communications to systems which may not have answer capability at all hours. Dashed lines therefore require telephone coordination to be certain the receiving system is ready. Since all data connections are dial-up, it is also possible for TUOs and IACs/STACs to communicate in the same fashion.

The file server is intended to maintain central data storage for all workstations in the office. Until that component is installed in the system, at least one of the workstations should be equipped with nonvolatile data storage of at least 10 MB. In addition to storing files, the central server also provides access from any workstation to the system printers.

The system will be equipped with at least two printers. One printer will be capable of printing graphic data as well as text. The other printer will be capable of printing "letter quality" output. The specific choice of printers should be influenced by any desires of the host institution for standardization or service. This market is undergoing technological transition, so

the final choice of printer should be made at the time the equipment is ordered.

The tape backup unit must be capable of recording either selected files from the system or of recording all files on the system. In addition, the unit must provide the capability to restore files to the system on a selective basis. The unit also must be capable of working with one of the workstations in case of failure of the central unit.

8.4 DESCRIPTION OF SYSTEM ADDITIONS

The basic office system needs to be augmented for additional functions which are unique to the IAC/STACs. These include the capability for post search processing, remote display of screen information, use of a portable system, and use of terminals dedicated to searching on-line databases. None of these items disrupts the basic system architecture, but they require additional hardware to be added to the system.

Figure 8-3, System Enhancements for IAC/STAC Offices, shows the basic system with these additions. The capability for post search processing is provided by the Lawrence Livermore Technology Information System (TIS). To use this capability, it is necessary to perform the search by connection to the on-line database via the TIS. The information extracted from the database is then processed by the TIS to remove duplicates and to arrange the output in a more readable format. Because of legal restrictions, this service is available only for searches of Government databases such as the NASA RECON. (Note: The legal restrictions on use of post search processing by the TIS may be removed by some or all database vendors involved with the NASA TU offices.)

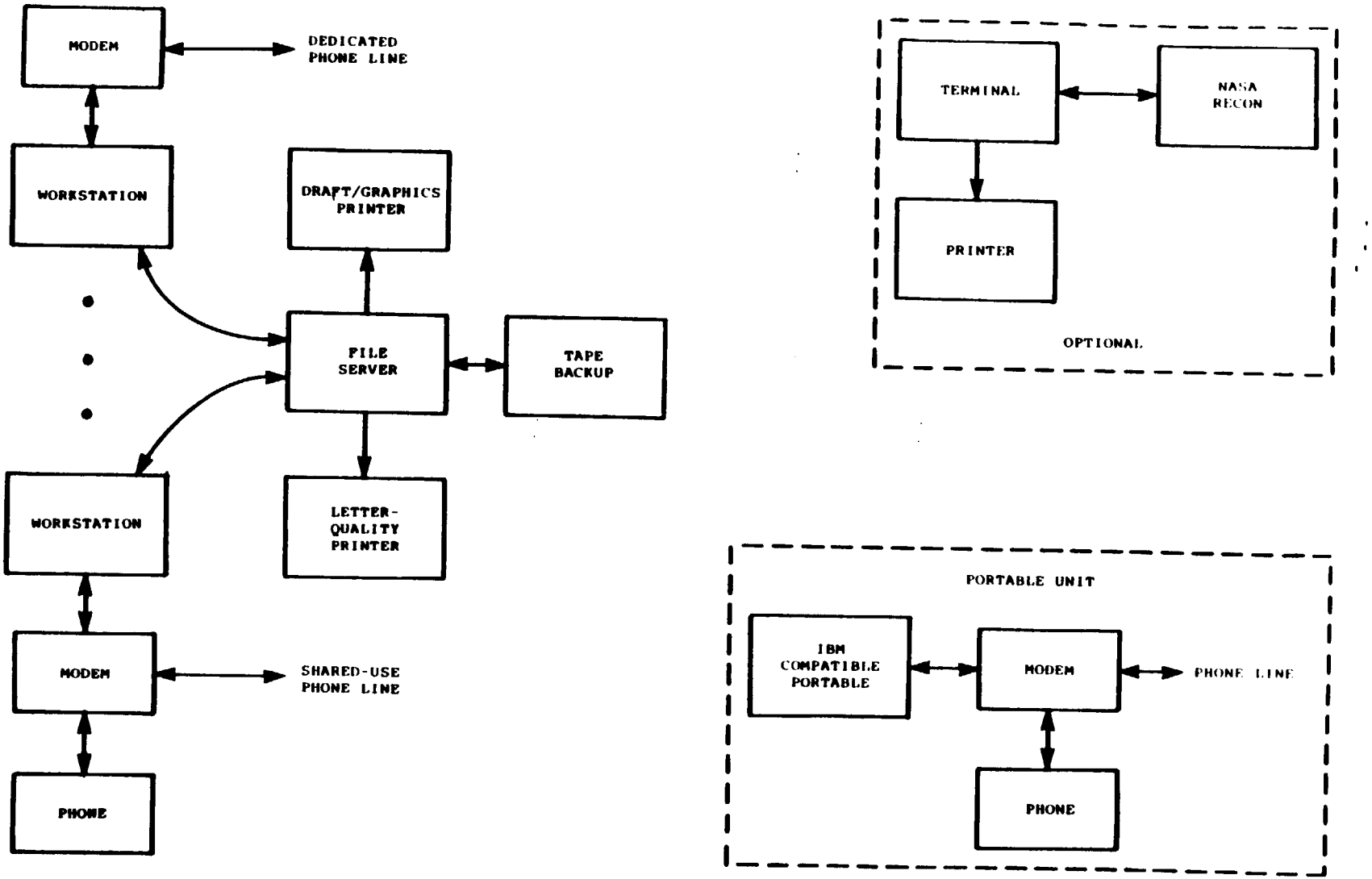

FIGURE 8-3

SYSTEM ENHANCEMENTS FOR IAC/STAC OFFICES

The capability for remote display of screen information is provided in one of two possible fashions. The Remote Interactive Searching System, developed by the University of California at Los Angeles, is installed in the system as part of the system component labeled "modem". This allows a second telephone line to be utilized to route to the client the same information displayed on the terminal screen at the IAC/STAC. A third telephone line is then used for voice communication between the information specialist and the client. An alternative method of achieving the same function is use of the interactive teaching mode of the TIS. In that case, the search must be performed utilizing the TIS, and the client's system is connected to a line from the TIS. The client and the information specialist communicate by voice in the same manner, and the effect is essentially the same on the client's terminal screen.

The portable system stands independent of the basic system architecture, provided the communication software and modem used in the portable system is functionally compatible with the basic system. Any dedicated terminals used at the IAC/STACs also stand independent of the basic system architecture. Since there is no electronic interface between the terminal and the rest of the system, any information received on the terminal must be handled manually. In some cases, this may be adequate for most of the information, but use of the basic system as a terminal affords greater opportunity for utilizing the full capability of the system to handle the data received from an on-line search.

APPENDIX A

SURVEY LETTER AND FORM

NASA

National Aeronautics and
Space Administration

Washington, D C
20546

Reply to Attn of

November 27, 1984

MEMORANDUM for Distribution

From: I/Manager, Industrial
Applications Program

Subject: TU Automation
and Communications Requirements

A Task has been added to an existing contract with Computer Technology Associates (CTA) to assess automation requirements of individual TU Program components and recommend options for alternative system architectures for the Technology Utilization family. The approach being taken by CTA includes a survey of the office automation and communications needs of each TU entity, e.g. IACs, Field Center TUOs, etc. CTA's analysis and recommendations will be based heavily on responses from the individual TU components.

CTA has prepared a survey form, which you will find attached, to facilitate the collection of information concerning individual program component needs. Part I of this survey covers office functions, work elements produced, and problem areas. Part II covers your present hardware/software/communications configuration. In addition, CTA will conduct selected on-site interviews, primarily at NASA IACs and STACs, and will follow up by phone with all participants.

CTA is required to complete this task under a very tight schedule. The information furnished in response to the survey questionnaire is urgently required in order to proceed to successive steps in the Task. Therefore, we would appreciate your completing the questionnaires right away so that they may be received at CTA no later than December 10, 1984. (A preaddressed envelope is enclosed for your use.)

We believe that the results of this task will be of assistance to us all, and should constitute a useful step toward improving our individual and common automation and communications requirements. Thank you in advance for your efforts.

R. G. Bivins, Jr.

R. G. Bivins, Jr.

Attachment

DISTRIBUTION

ARAC/T. Janis
FlaSTAC/R. Thorton
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JSC/W. Chmylak
KSC/R. Barnett
LaRC/J. Samos
LeRC/H. Allen
MSFC/I. Akbay
JPL/W. Spuck

TECHNOLOGY UTILIZATION OFFICES
OFFICE FUNCTION SURVEY

PART I

The first part of this survey form is intended to aid each office of the Technology Utilization "family" in considering those functions performed by the office which relate to the mission of the NASA Technology Utilization organization. Responses obtained by this survey will be used to analyze and catalog TU requirements for a distributed system which will automate many office functions and facilitate inter-office communication. This survey form should be used as a "thought stimulator". If the functions and requirements of your office do not seem to fit neatly within the boundaries of the structure of these survey forms, please provide the additional information in your own format.

Please make copies of the blank forms if additional forms are required. One set of the forms has been completed with typical (but hypothetical) responses to give a better understanding of the kind of information desired. Please mark each form with the name of the TU office responding.

1. GENERAL INFORMATION - Form 1

   This form is self-explanatory.

2. CURRENT OFFICE FUNCTIONS - Form 2

   Please list each office function, program element, or work element performed by your office which relates to the mission of the TU organization. The items on this list should look beyond mechanical considerations (such as typing, filing, telephoning) to emphasize the purpose or objective of the function. Examples include: maintaining records of contacts from clients; collecting statistics on inquiries from industry for inclusion in reports to NASA Headquarters, preparing reports, summarizing technology surveys, etc.

2. ITEMS PRODUCED - Form 3

   Please list the products or work items generated by your office. For each of these, answer the following questions:

   - To whom is the product or item sent?
     Typical recipients include:
     - clients
     - NASA Headquarters

- other TU offices
- other people at this location

- What is the stimulus that requires the product or item to be produced?

- What information is required to produce each product or item?

- Where do you obtain the required information?

- What procedure do you use for producing the product or item?

- How do you determine that the product or item is ready for release?

- How do you judge the overall quality or value of the product?

This information can be provided on the blank table provided. As a suggestion, we have completed one page of this table with a sample response.

3. PROBLEM AREAS - Form 4

Please list any products that require large amounts of time, effort, or expenditure to produce and also list those products which you consider to cause you problems. These will receive special consideration in developing requirements for automated processes. In addition to listing the product, please list the features of the products or other circumstances which make the product a problem.

TECHNOLOGY UTILIZATION OFFICES
OFFICE FUNCTION SURVEY

PART II

The second part of this survey form is intended to aid each office of the Technology Utilization "family" in considering the current capabilities of their office. Responses obtained by this survey will be used to analyze and catalog TU requirements for a distributed system which will automate many office functions and facilitate inter-office communication. This survey form should be used as a "thought stimulator". If the capabilities of your office do not seem to fit neatly within the boundaries of the structure of this survey form, please provide the additional information in your own format. The following paragraphs summarize the types of information being requested; blank forms are attached for your convenience.

1. CURRENT OFFICE HARDWARE - Form 5

   Please list computer hardware currently in use in your office; include mainframe computers (e.g., DEC VAX, IBM 4341, Hewlett-Packard, etc..), microcomputers (e.g., Apollo, Sun, Xerox 1200), and personal computers (e.g., Lisa, Macintosh, IBM Personal Computer, etc..).

2. CURRENT OFFICE SOFTWARE - Form 5

   Please list computer software currently in use in your office; include operating systems (e.g., VMS,MVS, CP/M, PC-DOS), general purpose applications (e.g. Wordstar, Lotus 1-2-3, ORACLE), and special-purpose applications (e.g., NASA mailing list). Please indicate which computer system each software item resides on.

3. CURRENT OFFICE COMMUNICATION SYSTEMS - Form 6

   Please list communication links currently in use in your office; include telephone, teleconferencing, FAX, PBX, Local Area Networks, and dial-up capabilities. Please indicate which systems are connected by each of these links, and what response times are associated with each capability.

TECHNOLOGY UTILIZATION
OFFICE SURVEY

GENERAL INFORMATION

Office Completing This Response:	Date of Response:

Person(s) to be contacted if more information is needed:

Person	Telephone	Telemail ID

Total Number of pages in response:

Form 2	Form 3	Form 3	Form 5	Form 6	Added pages
____	____	____	____	____	____

Form 1

OFFICE FUNCTIONS
PROGRAM ELEMENTS
WORK ELEMENTS

Item: RESPOND TO CLIENT REQUEST FOR TECHNOLOGY
EXAMPLE: INFORMATION.

Item:
EXAMPLE: PERFORM TREND ANALYSIS OF CLIENT REQUESTS

Item:

Item:

Item:

Item:

Item:

Item:

Item:

Item:

TU OFFICE

Form 2

EXAMPLE

PRODUCTS PRODUCED
OR
WORK ITEMS

PRODUCT OR WORK ELEMENT:
Monthly Status report

DELIVERED TO:
NASA Headquarters

STIMULUS:
NASA procedure

INFORMATION REQUIRED:
Activity records, previous reports, cost/schedule data

SOURCE OF INFORMATION:
Local office files

PROCEDURE USED:
Access local text and database files, insert data from local paperwork, generate word processed report which is transmitted electronically via remote communications.

READY FOR RELEASE:
When required information has been included.

QUALITY:
Timeliness, succinctness

TU OFFICE

Form 3

PRODUCTS PRODUCED
OR
WORK ITEMS

PRODUCT OR WORK ELEMENT:

DELIVERED TO:

STIMULUS:

INFORMATION REQUIRED:

SOURCE OF INFORMATION:

PROCEDURE USED:

READY FOR RELEASE:

QUALITY:

TU OFFICE

Form 3

PROBLEM AREAS

EXAMPLE:

Product or Work Element:
"Customer Request" trend analysis

Features which make this a problem:
No automated data base of request information
manual statistical analyses methods currently used

Product or Work Element:

Features which make this a problem:

Product or Work Element:

Features which make this a problem:

Product or Work Element:

Features which make this a problem:

Product or Work Element:

Features which make this a problem:

TU OFFICE

Form 4

HARDWARE/SOFTWARE SYSTEM CONFIGURATION

COMPUTER SYSTEM and OPERATING SYSTEM:	SOFTWARE:
EXAMPLE: IBM PC/AT PC DOS 3.0	Symphony, Wordstar
COMPUTER SYSTEM and OPERATING SYSTEM: EXAMPLE: DEC VAX 11/780 VMS, UNIX	SOFTWARE: under VMS: FORTRAN, Pascal, Mailing label program under UNIX: C, bibliographic ~~code~~ DBMS
COMPUTER SYSTEM and OPERATING SYSTEM:	SOFTWARE:
COMPUTER SYSTEM and OPERATING SYSTEM:	SOFTWARE:
COMPUTER SYSTEM and OPERATING SYSTEM:	SOFTWARE:

TU OFFICE

Form 5

COMMUNICATION SYSTEM CONFIGURATION

	COMMUNICATION LINK:	FROM:	TO:	DATA RATE:
EXAMPLE:	LAN	IBM PC	IBM PC	1 Million Bits/Sec
	COMMUNICATION LINK:	FROM:	TO:	DATA RATE:
	COMMUNICATION LINK:	FROM:	TO:	DATA RATE:
	COMMUNICATION LINK:	FROM:	TO:	DATA RATE:
	COMMUNICATION LINK:	FROM:	TO:	DATA RATE:
	COMMUNICATION LINK:	FROM:	TO:	DATA RATE:
	COMMUNICATION LINK:	FROM:	TO:	DATA RATE:
	COMMUNICATION LINK:	FROM:	TO:	DATA RATE:
	COMMUNICATION LINK:	FROM:	TO:	DATA RATE:
	COMMUNICATION LINK:	FROM:	TO:	DATA RATE:

TU OFFICE

Form 6

APPENDIX B

SURVEY RESPONSES

APPENDIX	TITLE
B1	GENERAL OFFICE INFORMATION
B2	OFFICE FUNCTIONS
B3	PRODUCTS OR WORK ITEMS, PART 1
B4	PRODUCTS OR WORK ITEMS, PART 2
B5	PROBLEM AREAS
B6	HARDWARE/SOFTWARE SYSTEM CONFIGURATION
B7	COMMUNICATION SYSTEM CONFIGURATION

APPENDIX B1

GENERAL OFFICE INFORMATION

TU OFFICE INFORMATION

OFFICE TYPE	OFFICE	OFFICE NAME AND ADDRESS	CONTACT NAME(S) AND PHONE NUMBER(S)	OFFICE STAFF
IAC	ARAC	Aerospace Res. Appl. Center 611 North Capitol Indianapolis, IN 46204	Dr. F. T. Janis, Ph.D. (317) 264-4611 John M. Ulrich (317) 264-4644 Adele T. Abrahamson (317) 264-4644	14
STAC	FLSTAC	NASA/FLA Tech. Appl. Center 307 Weil Hall Gainsville, FL 32611	J. Ronald Thornton (904) 392-6626 Lynn Heer (904) 392-0853	16
STAC	KYSTAC	NASA/UK TAP 109 Kinkead Hall University of Kentucky Lexington, KY 40506	Dick Dedic (606) 257-6322	6
IAC	KIAC	Kerr Indust. Appl. Center Southeastern Okl. St. Univ. Durant, OK 74701	Dickie Deel (405) 924-6822	7
IAC	NCSTRC	N.C. Sci. & Tech. Res. Center P.O. Box 12235 Research Triangle Pk, NC 22709	Dr. James Earl Vann (919) 549-0671 Mr. Bob Potter (919) 549-0671 Ms. Beverly Horne (919) 549-0671	17
IAC	NERAC	New England Research Center Mansfield Professional Park Storrs, CT 06268	Daniel U. Wilde (203) 486-4533	57
IAC	NIAC/PGH	NASA Indust. Appl. Center Univ. of Pittsburgh 823 William Pitt Union Pittsburgh, PA 15260	Paul A. McWilliams, Ph.D. (412) 624-5211 Jan P. Miller (412) 624-5214	

TU OFFICE INFORMATION

OFFICE TYPE	OFFICE	OFFICE NAME AND ADDRESS	CONTACT NAME(S) AND PHONE NUMBER(S)	OFFICE STAFF
IAC	NIAC/USC	NASA Indust. Appl. Center Univ. of Southern Calif. 3716 S. Hope Street, #200 Los Angeles, CA 90007	Martin Zeller (213) 743-6132 Bob Mixer (213) 743-6132	4
IAC	TAC	Technology Application Center University of New Mexico Albuquerque, NM 87131	Dr. Stanley A. Morain (505) 277-4000 Kay Eakes (505) 277-3622	8
AT	COSMIC	COSMIC 112 Barrow Hall University of GA Athens, GA 30602	John A. Gibson (404) 542-3265 Rex S. Walker (404) 542-3265	6
AT	DRI	Indust. Econ. & Mgmt. Div. P.O. Box 10127 Denver, CO 80210	Richard Chapman (303) 753-2611	3
AT	STIF	TU Office, NASA STIF P.O. Box 8757 BWI Airport, MD 21240	Walter Heiland (301) 621-0241	7
TUO	ARC	Technology Utilization Office Mail Code 234-2 Ames Research Center San Jose, CA 94035	Stanley Miller (415) 694-6472	3
TUO	JSC	Technology Utilization Office Code AL32 Johnson Space Center Houston, TX 77058	William Chmylak (713) 483-3809	4
TUO	KSC	Technology Projects Office Code PT-TPO-A Kennedy Space Center, Fl 32899	U. Reed Barnett (305) 867-3017 Tom M. Hammond (305) 867-3017 Helen R. LaCroix (305) 867-3017	4

TU OFFICE INFORMATION

OFFICE TYPE	OFFICE	OFFICE NAME AND ADDRESS	CONTACT NAME(S) AND PHONE NUMBER(S)	OFFICE STAFF
TUO	LARC	Technology Utilization Office Mail Stop 1394 Langley Research Center Hampton, VA 23665	John Samos (804) 865-3281 Charles J. Shoemaker (804) 865-3281	8
TUO	MSFC	Technology Utilization Office Code AT01 Marshall Space Flight Center MSFC, AL 35812	John R. Richardson (205) 453-2223	4
TUO	JPL	Technology Utilization/Patents Jet Propulsion Laboratory 4800 Oak Grove Drive Pasadena, CA 91109	Jim English (818) 354-3318	3
AT	SRI	SRI International 333 Ravenswood Ave Menlo Park, CA 94025	Ruth Lizak (415) 859-3778 John Chamberlain (415) 859-6745	9

APPENDIX B2

OFFICE FUNCTIONS

OFFICE FUNCTIONS

OFFICE	FUNCT NO.	FUNCTION PERFORMED BY THE OFFICE
ARAC	20101	Preparing written proposals for technical studies to potential clients and maintaining records of these proposals as potential sales
ARAC	20102	Assigning engineers and monitoring progress of technical staff on accepted projects as well as maintaining all records of on-going projects
ARAC	20103	Conducting studies for clients, evaluating and interpreting all data compiling into a final technical report
ARAC	20104	Compile statistical data to be used in monthly and quarterly financial reports, preparation of these reports and distribution to NASA personnel
ARAC	20105	Establish sales representatives in various locations, coordinate sales effort and provide training programs for marketing staff
ARAC	20106	Conducting world wide data searches by computer for information to be incorporated into technical studies
ARAC	20107	Ordering documentation to be used by technical staff in preparing technical reports for clients
FLSTAC	20201	Respond to client request for technology information
FLSTAC	20202	Perform trend analysis of client requests
FLSTAC	20203	Collecting cost data for NASA reports
FLSTAC	20204	Preparing budgets for proposals
FLSTAC	20205	Maintaining records on contacts from clients
FLSTAC	20206	Client billing and invoicing
KIAC	20401	Literature Search

OFFICE FUNCTIONS

OFFICE	FUNCT NO.	FUNCTION PERFORMED BY THE OFFICE
KIAC	20402	Document Ordering
KIAC	20403	Information and/or Referral
KIAC	20404	Maintain KIAC Library
KIAC	20405	533-Q
KIAC	20406	MIR Quarterly
KIAC	20407	533-M
KIAC	20408	Evaluation of searches performed
KIAC	20409	Quarterly Progress Report
KIAC	20410	Preparation of Annual Application
KIAC	20411	Annual Report
KIAC	20412	Budget Control
KIAC	20413	Monthly Financial Report
KIAC	20414	Monthly Marketing Report
KIAC	20415	Monthly Salesperson's Report
KIAC	20416	Quarterly Summary
KIAC	20417	Purchasing
KIAC	20418	Invoices
KIAC	20419	Payroll
KIAC	20420	Travel Claims
KIAC	20421	Daily Computer Entry of Client Data
KIAC	20422	Preparing Completed Searches for mailing to client

OFFICE FUNCTIONS

OFFICE	FUNCT NO.	FUNCTION PERFORMED BY THE OFFICE
KIAC	20423	Monthly Progress Report
KIAC	20424	Monthly Benefit Letter Report
KIAC	20425	Monthly Management Information Report
KIAC	20426	Quarterly Completed Totals Report
KIAC	20427	Quarterly Search Characteristics Summary Report
KIAC	20428	Quarterly Unduplicated Clients List Report
KIAC	20429	Quarterly Data Bases Used and Frequency Report
KIAC	20430	Quarterly Titles of Searches Completed Report
KIAC	20431	Monthly Backup of all Computer Accounts onto Magnetic Tape
KIAC	20432	Aviation Newsletter
NCSTRC	20501	Identification and evaluation of prospective clients
NCSTRC	20502	Analysis of costs for services
NCSTRC	20503	Price estimating for services, individually developed for each client request (see products) as each case is unique
NCSTRC	20504	Submission of proposals and design of service packages for individual clients. Includes price estimating (above)
NCSTRC	20505	Evaluation of clients' prior activity
NCSTRC	20506	Responding to inquiries from prospective clients
NCSTRC	20507	Maintaining records of current and prospective client contacts (correspondence and phone calls)
NCSTRC	20508	Identification, evaluation and reporting of technology transfer and benefits cases

OFFICE FUNCTIONS

OFFICE	FUNCT NO.	FUNCTION PERFORMED BY THE OFFICE
NCSTRC	20509	Special reporting to NASA (e.g., NC/STRC services to small businesses)
NCSTRC	20510	Construction of database of potential and current clients to be updated at regular intervals and for multiple purposes. At present, in data-collecting phase awaiting appropriate computer capabilities
NCSTRC	20511	Production of management information reports (MIRs) for manager of IAC programs (client income acitivity)
NCSTRC	20512	Production of trip reports (record of clients contacted and results)
NCSTRC	20513	Preparation of itineraries for client contacts
NCSTRC	20514	Cost accounting
NCSTRC	20515	Control of operating inventories
NCSTRC	20516	Production control
NCSTRC	20517	Production of work orders
NCSTRC	20518	Inventory of hardware, software and office equipment
NCSTRC	20519	Performance against budget
NCSTRC	20520	Collection of overdue accounts
NCSTRC	20521	Follow-up of services to clients
NCSTRC	20522	Follow-up of prospective client contacts
NCSTRC	20523	Creation and maintenance of mailing lists, (open house, Technical Bulletin, promotional mailing, etc.)
NCSTRC	20524	Maintenance of weekly and monthly time sheets

OFFICE FUNCTIONS

OFFICE	FUNCT NO.	FUNCTION PERFORMED BY THE OFFICE
NCSTRC	20525	Maintenance of monthly expense statements
NCSTRC	20526	Production of individual (employee) monthly activity reports
NCSTRC	20527	Maintenance of records of documents procured per client request
NCSTRC	20528	Development of NASA proposals
NCSTRC	20529	Production of Monthly, Quarterly and Annual reports to NASA
NCSTRC	20530	Billing of clients for services
NCSTRC	20531	Maintenance of accounts receivable records
NCSTRC	20532	Maintenance of documentation of all fiscal operations
NCSTRC	20533	Accounts payable
NCSTRC	20534	Document procurement
NCSTRC	20535	Service activity reporting by client
NCSTRC	20536	Literature services
NERAC	20601	Respond to client requests for technology information - local government/state government/universities and businesses
NERAC	20602	Contact potential clients to explain information retrieval process and solicit information searches
NERAC	20603	Respond to NASA HQ requests for information searches
NERAC	20604	Make presentations to local community groups/organizations about NASA and the technology utilization function

OFFICE FUNCTIONS

OFFICE	FUNCT NO.	FUNCTION PERFORMED BY THE OFFICE
NERAC	20605	Perform evaluation of information retrieval services to clients - collection and analysis of responses from clients
NERAC	20606	Prepare and forward monthly and annual reports to NASA Headquarters
NERAC	20607	Respond to client requests for assistance under NASA SBIR program
NERAC	20608	Respond to requests for assistance from small businesses for economic and technical information to start-up a business
NIAC/PGH	20701	Respond to client requests for information products and information system studies
NIAC/PGH	20702	Respond to client requests for engineering and physical sciences studies
NIAC/PGH	20703	Respond to client requests for environmental and health-related studies
NIAC/PGH	20704	Respond to client requests for executive, management and decision support studies
NIAC/PGH	20705	Prepare regular MIR reports to NASA
NIAC/PGH	20706	Prepare weekly production reports
NIAC/PGH	20707	Respond to ad hoc requests for program information from NASA headquarters and related entities.
NIAC/PGH	20708	Prepare weekly and monthly finance reports
NIAC/PGH	20709	Prepare annual NASA proposal and budget
NIAC/PGH	20710	Respond to client requests for customized products and services with proposals

OFFICE FUNCTIONS

OFFICE	FUNCT NO.	FUNCTION PERFORMED BY THE OFFICE
NIAC/PGH	20711	Prepare presentations for site visits by clients and NASA officials
NIAC/PGH	20712	Respond to ad hoc requests for program and fiscal information for university administration
NIAC/USC	20801	Perform computerized literature searches in response to client requests for information on a wide variety of topics
NIAC/USC	20802	Identify experts within the NASA system, other Federal labs, universities and private industry, who can consult with or provide solutions to specific production problems posed by clients (Tech Search)
NIAC/USC	20803	Solicit potential clients by means of marketing seminars and demonstrations
NIAC/USC	20804	Maintain statistical data on client activity, sales, accounts receivable, etc.
NIAC/USC	20805	Procure copies of documents identified in computer searches
NIAC/USC	20806	Generate quarterly and annual reports
NIAC/USC	20807	Facilitate and improve effectiveness of information transfer by means of Remote-Interactive Search Service
NIAC/USC	20808	Conduct benefit surveys and maintain file of evaluations of NIAC service
NIAC/USC	20809	Produce promotional literature
TAC	20901	Maintain client contacts for benefit reporting
TAC	20902	Maintain product and service oriented mailing lists

OFFICE FUNCTIONS

OFFICE	FUNCT NO.	FUNCTION PERFORMED BY THE OFFICE
TAC	20903	Collect and analyze statistics on all products and services
TAC	20904	Prepare quarterly reports, management information reports, and annual reports for NASA
TAC	20905	Prepare monthly financial statements for TAC director and UNM accounting
TAC	20906	Maintain all financial records for all product and service clients
COSMIC	21001	Respond to Client Request for Program Information
COSMIC	21002	Receipt of Software Submittals
COSMIC	21003	Program Screening
COSMIC	21004	Maintenance of Documentation Library
COSMIC	21005	Maintenance of Documentation Library
COSMIC	21006	Order Taking
COSMIC	21007	Order Processing
COSMIC	21008	Order Entry
COSMIC	21009	Order Shipping
COSMIC	21010	Lease Records Maintenance
COSMIC	21011	Monthly Progress Report Preparation to NASA
COSMIC	21012	Annual Progress Report Preparation to NASA
COSMIC	21013	Small Business Quarterly Report Preparation
COSMIC	21014	Small Business Semi-Annual Report Preparation
COSMIC	21015	Monthly Progress Report Preparation to the NASTRAN Advisory Group (NAG)

OFFICE FUNCTIONS

OFFICE	FUNCT NO.	FUNCTION PERFORMED BY THE OFFICE
COSMIC	21016	Monthly Report to TU Officers
COSMIC	21017	Monthly report to IAC/STAC Directors
COSMIC	21018	Preparation of NASTRAN NEWS (three times/year publication about NASTRAN Activities - Cir. 1100)
COSMIC	21019	NASTRAN User's Colloquium
COSMIC	21020	Benefits Survey
COSMIC	21021	Benefits Reports
COSMIC	21022	Benefits Records
COSMIC	21023	Customer Contact File
COSMIC	21024	News Releases
COSMIC	21025	Subcontract Files
COSMIC	21026	Communist Bloc Contact File
COSMIC	21027	Catalog Preparation
COSMIC	21028	Telephone Answering
COSMIC	21029	Preparation of Internal Reports
COSMIC	21030	Additional Information Request to TU Officers
COSMIC	21031	General Filing of COSMIC Correspondence
COSMIC	21032	File of Program Abstracts
STIF	21401	Respond to general and specific TU inquiries
STIF	21402	Maintain mailing list for NASA Tech Briefs and Technical Support Packages(TSPS)
STIF	21403	Maintains reproduce and mailout of TSPS

OFFICE FUNCTIONS

OFFICE	FUNCT NO.	FUNCTION PERFORMED BY THE OFFICE
STIF	21404	TSP follow-up and research in support of SPINOFF (see below)
STIF	21405	Catalogue and abstract NASA Tech Briefs
STIF	21406	Develop NASA's annual TU Report SPINOFF
ARC	21501	Maintain current contract records for ARC & DFRF
ARC	21502	Maintain status records for 450 Tech Briefs in process
ARC	21503	Maintain records on Space Act awards
ARC	21504	Maintain data base for all NASA Tech Briefs
ARC	21505	Maintain data base for Spinoff items
ARC	21506	Produce periodic reports on bbone
JSC	21701	Encourages the reporting of computer programs and technical and engineering innovations and developments in this field by interviewing engineers, scientists, and mgmt employees of JSC and its contract
JSC	21702	Advises and assists industry, the public, and the scientific community and other Governmental agencies regarding the application and utilization of advances and discoveries in technology stemming
JSC	21703	Attends special meetings, symposiums, and other gatherings dealing with the dissemination of NASA new technology and technical information
JSC	21704	Coordinates planning and adm. of JSC activities in App. Engineering projects, an Agency-wide pgm. for adaptive engineering of NASA tech. to assure its application to ind., medical, and social problem
JSC	21705	Prepares periodic reports conc. the most imp. uses being made ofinnovations in new technology. These reports are forwarded to NASA HQ and other organizations where they may be further disseminated

OFFICE FUNCTIONS

OFFICE	FUNCT NO.	FUNCTION PERFORMED BY THE OFFICE
JSC	21706	Respond to various in-house requests, Tech Briefs, and Spinoffs information as it relates to JSC and the other field centers
JSC	21707	Coordinate effort with the Industrial Application Coordinator in responding to the wide range of aerospace related items requested
KSC	21801	Respond to client request for technology information
KSC	21802	Perform trend analysis of client requests
KSC	21803	Track new technology reports
KSC	21804	Track status of contracts having patent or new technology clauses
KSC	21805	Process problem statements
KSC	21806	Keep records of spinoff/tech brief distribution
KSC	21807	Maintain status of Application Engineering projects
KSC	21808	Order, track, COSMIC reports/requests
LARC	21901	Administer "New Technology" Clauses in contracts and grants
LARC	21902	Identify new technology items produced by Langley personnel
LARC	21903	Evaluate all new technology items
LARC	21904	Coordinate processing of new technology items with Patent Counsel
LARC	21905	Send computer programs to COSMIC
LARC	21906	Have new technology items prepared for publication in Tech Brief Journal

OFFICE FUNCTIONS

OFFICE	FUNCT NO.	FUNCTION PERFORMED BY THE OFFICE
LARC	21907	Transmit new technology items to publisher of Tech Brief Journal
LARC	21908	Keep records of published new technology items
LARC	21909	Send information monthly for Tech Brief awards
LARC	21910	Arrange Tech Brief award presentations
LARC	21911	Prepare or have prepared Technical Support Packages for Tech Briefs
LARC	21912	Send reproducible copy of Technical Support Package to NASA Scientific and Technical Information Facility
LARC	21913	Keep record of requests for Technical Support Packages
LARC	21914	Have a Technology Transfer Agent appointed for each research-oriented Division at the Center
LARC	21915	Arrange an annual Technology Transfer Agent meeting
LARC	21916	Arrange annual awards for the individual and the Division that contributed the most to the Technology Utilization Program
LARC	21917	Identify, prepare, and submit items to the IR-100 Competition annually
LARC	21918	Have exhibits designed and fabricated for the winners of the IR-100 Competition
LARC	21919	Follow up with rquesters of technology to determine the benefits they derived(spinoffs)
LARC	21920	Arrange for visit of industry personnel (principally nonaerospace companies) to acquaint them with LaRC technology pertinent to their needs

OFFICE FUNCTIONS

OFFICE	FUNCT NO.	FUNCTION PERFORMED BY THE OFFICE
LARC	21921	Identify suitable application projects
LARC	21922	Identify potential manufacturers that can participate in the application project and later manufacture the item for the market
LARC	21923	Obtain co-sponsor for application project, other Government Agency, industry, etc.
LARC	21924	Prepare or have prepared an interagency agreement or memorandum of understanding with participants
LARC	21925	Prepare Research and Technology Objectives and Plans
LARC	21926	Prepare a Project Plan for each applications engineering project
LARC	21927	Prepare a Commitment and Obligation Plan for funded projects
LARC	21928	Provide input for Program Operating Plans
LARC	21929	Approve purchases for projects
LARC	21930	Keep an account of the finances of all projects
LARC	21931	Prepare Quarterly Project Status Reports
LARC	21932	Arrange for prototype hardware to be evaluated by potential users
LARC	21933	Maintain contact with hardware evaluator
LARC	21934	Coordinate demonstrations of prototype hardware
LARC	21935	Provide items for exhibit at the Visitor Center
LARC	21936	Give talks about Technology Utilization at local clubs, on TV programs, and to newspaper reporters
LARC	21937	Answer requests for NASA technology

OFFICE FUNCTIONS

OFFICE	FUNCT NO.	FUNCTION PERFORMED BY THE OFFICE
LARC	21938	Coordinate meetings between industrial visitors and Center researchers
LARC	21939	Set up meetings requested by NASA Headquarters personnel
LARC	21940	Plan conferences that transfer NASA technology to industry
LARC	21941	Arrange for NASA experts to visit industry
LARC	21942	Identify NASA expertise that may solve problems identified by local government departments
LARC	21943	Provide potential solutions to problem statements to a Technology Applications Team
LARC	21944	Prepare Purchase Request for writer to produce Tech Briefs and Technical Support Packages
LARC	21945	Prepare Quarterly Activity Report
LARC	21946	Prepare Travel Requests
LARC	21947	Prepare Purchase Requests for special supplies
LARC	21948	Answer surveys from NASA Headquarters contractors
LARC	21949	Administer "For Early Domestic Dissemination" policy
LARC	21950	Administer "Distribution of NASA Computer Programs" policy
LARC	21951	Assemble information for the annual "NASA Spinoff" publication
MSFC	22101	MFS Number Master Log
MSFC	22102	Reportable Item Record (File)
MSFC	22103	New Technology Transmittal Form - NASA Form 666

OFFICE FUNCTIONS

OFFICE	FUNCT NO.	FUNCTION PERFORMED BY THE OFFICE
MSFC	22104	Tech Brief Index
MSFC	22105	Maintain Contract File
MSFC	22106	Maintain Space Act Award Program Data
MSFC	22107	Prepare Monthly Space Act Award Submission Form
MSFC	22108	Prepare Space Act Awards Transmittal Correspondence
MSFC	22109	Maintain "New Technology Contract Resume" cards for each contract - MSFC Form 3293
MSFC	22110	Maintain "New Technology Management Information System" contract data point for admin. of NT and patent clauses
MSFC	22111	Research and Technology Operating Plan (RTOP)
MSFC	22112	A&PS Work Package
MSFC	22113	Management Presentation Charts
MSFC	22114	Technology Utilization Activity Report
MSFC	22115	Prepare and maintain records transfer lists for retired contracts and reportable items (MSFC Form 578)
MSFC	22116	Travel Projections
JPL	22201	Respond to requests for technical support packages
JPL	22202	Respond to telephone requests for information relating to JPL inventions/innovations
JPL	22203	Respond to NASA requests for information
JPL	22204	Participate in meetings where TU is discussed and in demonstrations of TU items

OFFICE FUNCTIONS

OFFICE	FUNCT NO.	FUNCTION PERFORMED BY THE OFFICE
JPL	22205	Maintain a library of TU information
JPL	22206	Make searches of JPL literature for TU purposes
JPL	22207	Contact prospective transferees of TU items
JPL	22208	Answer requests for expert opinions by JPL scientists when appropriate
SRI	22301	Evaluate documented technologies for Spinoff potential
SRI	22302	Coordinate evaluators and evaluations
SRI	22303	Respond to TUO request for technology information
SRI	22304	Provide literature to support evaluations

APPENDIX B3

PRODUCTS OR WORK ITEMS

PART 1

PRODUCTS OR WORK ITEMS - PART 1

OFFICE ITEM NO.	PRODUCT	DELIVERED TO	STIMULUS	INFORMATION REQUIRED	SOURCE
ARAC 30101	Monthly Quarterly Financial Reports	NASA Headquarters	NASA Procedure	Monthly and cumulative financial figures for contract period	Local office records
ARAC 30102	Technical Studies	Clients	Request by client to undertake study for a proposed fee	Recommendations and/or solutions to technical problems, usually manufacturing related	Personal contact with client, database searches, telephone contacts, staff discussion, report written
ARAC 30103	Proposals	Clients	Sales representatives request a written proposal to clients	Type of technical study needed, information from potential client as to needs and requirements, cost and scheduling information	Sales representatives, potential client's personnel
FLSTAC 30201	Monthly status report, monthly contractor report, and NASA Quarterly Management Information Report	NASA Headquarters	NASA Procedure	Activity records, previous reports, cost and labor data, income data	Local office files
FLSTAC 30202	NASA forms 294 & 295 (subcontractor reports) on Small and Small Disadvantaged Business Concerns	NASA Headquarters	NASA Procedure	Cost data on meeting small and small disadvantaged business goals	Computer printouts generated from university accounting on disbursements
FLSTAC 30203	Technology transfer activities via use of NASA RECON database, Chemical Abstract, engineering. ***	Client	Requests from client	Client information need analysis	Appropriate computerized databases or other relevant sources (NASA, documents, NTIS reports, etc.)

PRODUCTS OR WORK ITEMS - PART 1

OFFICE ITEM NO.	PRODUCT	DELIVERED TO	STIMULUS	INFORMATION REQUIRED	SOURCE
KIAC 30401	Literature Search	Client	Search requests come from field representatives, phone calls, letters, and personal visits.	The client provides a description of the problem. Key words and a search strategy are formulated. The product is bibliographic citations, full text documents, and other appropriate information. ***	Client provides statement of the problem. Consultants, experts, and resource material provide solutions. Principle sources of bibliographic information are NASA, Dialog, Orbit, and DOE.
KIAC 30402	Document Ordering	Client	Request by client	Bibliographic information such as title, author, source, data base accession number	Client provides document description. Documents are ordered from NASA/STIF, NTIS, and other commercial suppliers if they are not in the KIAC library
KIAC 30403	Information and/or Referral	Client	From a client requesting information that does not require a search	Description of the problem or question	Client provides a description of the problem. Information and referrals are provided by IAC Coordinators, files, and the KIAC library
KIAC 30404	Maintain KIAC Library	Office	KIAC receives publication (hardcopy and micro fiche) periodically from STIF	NASA/STIF	Reviewed, cataloged, and shelved

PRODUCTS OR WORK ITEMS - PART 1

OFFICE ITEM NO.	PRODUCT	DELIVERED TO	STIMULUS	INFORMATION REQUIRED	SOURCE
KIAC 30405	533-Q	NASA Headquarters	NASA procedure	Previous 533-M and 533-Q	Local office files
KIAC 30406	MIR Quarterly	NASA Headquarters	NASA procedure	Computer print-outs providing data in response to appropriate questions on the MIR package, Bookkeeper's records, in-house monthly marketing reports	Local office files
KIAC 30407	533-M	NASA Headquarters	NASA procedure	Bookkeeper's monthly record and 533Q	Local office books or files
KIAC 30408	Evaluation of searches performed	NASA in QPR and in-house	NASA procedure	List of searches performed from computer print-out	Computer records, evaluations returned in response to written requests
KIAC 30409	Quarterly Progress Report	NASA Headquarters	NASA guidelines	Previous QPR, 533M, computer reports, and MIR	Office files, computer data
KIAC 30410	Preparation of Annual Application	NASA Headquarters	To receive funding	All QPR's for previous year. In-house plans for program emphasis in coming year	Files and input from staff
KIAC 30411	Annual Report	NASA Headquarters	NASA guidelines	All reports documenting activities of the reporting period	Files

PRODUCTS OR WORK ITEMS - PART 1

OFFICE ITEM NO.	PRODUCT	DELIVERED TO	STIMULUS	INFORMATION REQUIRED	SOURCE
KIAC 30412	Budget Control	Controller's report itemized according to budget line items to Director. Assistant Director. ***	Required on a monthly basis	Monthly expenditures report, indirect, and match information	Controller's report and office records
KIAC 30413	Monthly Financial Report	Director, Assistant Director, Adm. Asst.	Required on a monthly basis	Monthly expenditures and budget information	Controller's report and financial records
KIAC 30414	Monthly Marketing Report	Director, Assistant Director, Adm. Asst.	Required monthly	Mailing information, benefits evaluation information, and direct sales information	Monthly financial report
KIAC 30415	Monthly Salesperson's Reports	Director, Assistant Director, Adm. Asst, and all field representatives	Required monthly	Number of ID, IR, Direct, and NASA searches that each salesperson is responsible for, financial information including travel claims, commission on sales, telephone expenses, and cumulative income for year.	Computer files built daily entries of data, and financial records
KIAC 30416	Quarterly Summary	Director, Assistant Director, Adm. Asst., and DOED	Required every quarter for letter of request to DOED	Quarterly totals for labor, labor overhead and support expenses both for outside costs and University costs	Monthly Financial Reports

PRODUCTS OR WORK ITEMS - PART 1

OFFICE ITEM NO.	PRODUCT	DELIVERED TO	STIMULUS	INFORMATION REQUIRED	SOURCE
KIAC 30417	Purchasing	Purchasing department of University	Request from organizational element	Vendor name and address, item number and price	Vendor
KIAC 30418	Invoices	Clients ordering paid searches or documents	Necessary for each item charged to client on a cost recovery basis	Client name and address, name of document or search, price, computer charge, postage and handling charges	Technology Applications Analyst provides information concerning cost of document or search, and computer charge
KIAC 30419	Payroll	Bursar's office of the University	Required monthly	Name of each employee and amount earned for the month	Budget
KIAC 30420	Travel Claims	Bursar's office	Travel conducted by all staff and field representatives	Name of traveler, date of departure and return, mileage, per diem, and lodging expenses	Traveler
KIAC 30421	Daily Computer Entry of Client Data	Internal use	Required to generate monthly and quarterly reports	Company name, address, telephone, number of employees, sic and econ codes, control number, case number, search title, proposal info., study info., development cost, and benefits	Client Search Request Form
KIAC 30422	Preparing Completed Searches for mailing to client	Client	Client Requests	Completed searches	Analyst
KIAC 30423	Monthly Progress Report	Administrative Assistant	Required monthly	Total number of searches, completed in each category (ID, NASA, IR, DIRECT, CAMPUTS, PACKAGE, NON-PACKAGE)	Computer files built from daily entries of data

PRODUCTS OR WORK ITEMS - PART 1

OFFICE ITEM NO.	PRODUCT	DELIVERED TO	STIMULUS	INFORMATION REQUIRED	SOURCE
KIAC 30424	Monthly Benefit Letter Report	Administrative Assistant	Required monthly	Company name, address, control number, and search title listed by category (for benefit letters)	Computer files built from daily entries of data
KIAC 30425	Monthly Management Report	Administrative Assistant	Required monthly	Searches completed, number of clients served, sales, work in process, firms listed by size, economic area and sic code.	Computer files built from daily entries of data
KIAC 30426	Quarterly Completed Totals Report	Administrative Assistant	Required quarterly	Total number of searches completed in each category for the quarter (ID, NASA, IR, DIRECT, CAMPUS, PACKAGE, NON-PACKAGE)	Computer files built from daily entries of data
KIAC 30427	Quarterly Search Characteristics Summary Report	Administrative Assistant	Required quarterly	Search number, client category, sic code, economic code, abstracts sent, data bases used, and total number of abstracts sent	Computer files built from daily entries of data
KIAC 30428	Quarterly Unduplicated Clients List Report	Administrative Assistant	Required quarterly	Client's name, category and the number ot searches completed this quarter.	Run appropriate computer program

PRODUCTS OR WORK ITEMS - PART 1

OFFICE ITEM NO.	PRODUCT	DELIVERED TO	STIMULUS	INFORMATION REQUIRED	SOURCE
KIAC 30429	Quarterly Data Bases Used and Frequency Report	Administrative Assistant	Required quarterly	Name of data base and frequency used during this quarter	Computer files built from daily entries of data
KIAC 30430	Quarterly Titles of Searches Completed Report	Administrative Assistant	Required Quarterly	Search number, Category, State, and Subject of Search	Computer files built from daily entries of data
KIAC 30431	Monthly Backup of all Computer Accounts onto Magnetic Tape	Office FIles	Protection against computer file contamination	Computer files	Computer
KIAC 30432	Quarterly aviation Newsletter Publication	Subscribers	Required quarterly	Rough draft of newsletter	Editor of newsletter
NCSTRC 30501	Documentation	Client	Client orders resulting from search bibliographies or client's own sources.	Usual bibliographic data (title, author, probable source),cost.	
NCSTRC 30502	Retrospective search bibliographies	Clients	Client request	1 (From client): Definition of problem/question, monetary and time parameters. 2 (To satisfy request): Bibliographic data and abstracts of pertinent documentation.	(1) Client (2) Appropriate databases available through NASA or commercial vendors, local libraries
NCSTRC 30503	Current Awareness Profiles - Bibliographies	Client	Client request	1. (From client): Definition of search subject and monetary parameters. 2. (For response) Bibliographic data and abstracts of relevant documents.	Selected databases available through NASA or commercial vendors.

PRODUCTS OR WORK ITEMS - PART 1

OFFICE ITEM NO.	PRODUCT	DELIVERED TO	STIMULUS	INFORMATION REQUIRED	SOURCE
NCSTRC 30504	Report on Special Projects (In-depth studies, compliations)	Client	Request from client for assistance, followed by discussions, proposals, and negotiations	Definition of problem/question/project, parameters of time and monetary considerations scope, direction, and emphasis areas. (from client). Response information depends on type of project or study.	Depends on type of project--marketing data, technical information, compilations of various types. Some available by online computer searching, other sources include study, manual searching, contacts with subject experts.
KYSTAC 30601	Mass Mailings and Marketing Information	Potential clients	To generate new business	1. About NASA/UK TAP services 2. Client addresses	Telephone directories
KYSTAC 30602	Information search results	Clients - business/industry/local government/state government/universities	Client request for information	Description of problem	NASA Recon and other computerized data bases
KYSTAC 30603	Evaluation (Assessment of Benefits data)	Client then returned to NASA/UK TAP	NASA reporting requirement, improve quality of service. 3-6 months following search requests	Client information and search topic from MIS file - client completes remainder	NASA/UK TAP MIS files - client results of use of search information
KYSTAC 30604	Monthly Management Information Report	NASA Headquarters	Monthly requirement	Number of searches/client contacts/financial report/activity report	NASA/UK MIS and financial records

PRODUCTS OR WORK ITEMS - PART 1

OFFICE ITEM NO.	PRODUCT	DELIVERED TO	STIMULUS	INFORMATION REQUIRED	SOURCE
KYSTAC 30605	Spinoff contributions	NASA Headquarters	When it appears to be an appropriate contribution	Problem, information used to solve, photos (if available), text information to support	Client
KYSTAC 30606	Annual Report	NASA Headquarters	3 months after end of contract year	Numerical summary of search requests, analysis of evaluations, Executive summary	NASA/UK MIS - Miscellaneous record of office activities
KYSTAC 30607	Technical Report to clients	Client	Request for information	Problem solving/statistical	In-house research and a variety of outside technical resources
NIAC/PGH 30701	Weekly and Monthly Finance Reports	Senior staff	NIAC procedure	Detail of all sales, income and expenditures	Ledger and detail sheets
NIAC/PGH 30702	Weekly Production Report	Senior staff	NIAC Procedure	Details of each client-based case	Detailed case reports and project folders
NIAC/PGH 30703	NASA MIR Report	NASA Headquarters	NASA procedure	Production and financial statistics for one quarter	Internal records
NIAC/PGH 30704	Executive, management or decision support studies	Clients	Client request	Detailed client data, literature, expert opinions	University and regional libraries, NASA/RECON system, university faculty, commercial databases, regional consultants

PRODUCTS OR WORK ITEMS - PART 1

OFFICE ITEM NO.	PRODUCT	DELIVERED TO	STIMULUS	INFORMATION REQUIRED	SOURCE
NIAC/PGH 30705	1) Engineering and physical science studies 2) Environmental and health-related studies	Clients	Client requests	Literature and expert opinion	NASA technical coordinator, commercial databases, university and regional libraries, NASA/RECON system, university faculty and regional experts
NIAC/PGH 30706	Information products	Clients	Client request	Citations and abstracts, expert review	Commercial databases, university libraries, NASA/RECON system, university faculty
NIAC/USC 30801	Computer search package	Client	Client request for information	Collection of citations from various databases	Database distributors (DIALOG, NASA/RECON, BRS, SDC, NLM, etc.)
NIAC/USC 30802	Quarterly and Annual Reports	NASA HQ	Standard procedures	Cost data, activity records, previous reports	Office files
NIAC/USC 30803	Tech Search Report	Client	Client request	Contact names, addresses, phone numbers	Expert contacts in NASA, other Federal labs, universities, research institutes, private industry
NIAC/USC 30804	Documents	Client	Client request	Clear, complete citation	Computer search or other bibliography
NIAC/USC 30805	Information package	Client	Client inquiry	Standard package, preassembled	Local office files

PRODUCTS OR WORK ITEMS - PART 1

OFFICE ITEM NO.	PRODUCT	DELIVERED TO	STIMULUS	INFORMATION REQUIRED	SOURCE
NIAC/USC 30806	NIAC Retainer Contract	Client	Client request	Database supplier restrictions and distributor restrictions	Local files
TAC 30901	Financial records	Internal - Accounting Department	Accounting procedure	All records of sales and purchases	Customers, UNM, TAC personnel
TAC 30902	Maintaining product and service-oriented mailing lists	Internal marketing use	To inform the public of the technology transfer activities at TAC and how it can apply to them	Complete mailing addresses ot individuals and corporations	Past clients, membership lists, personal contacts
TAC 30903	Benefits reporting	NASA Headquarters	NASA requirement	See attached form and examples	Individual TAC staff
TAC 30904	Statistical Analyses	TAC management and potential entrepreneurs	Internal management program development occasional NASA requests	Of the type indicated in attached forms	UNM Contract and Grant Accounting internal TAC records
TAC 30905	Quarterly Reports, Monthly Information Reports (533)	NASA Headquarters and ONR	Contract requirement	Quarterly progress on contract elements. See attached	Monthly fiscal reports individual TAC staff published materials advertising copy
TAC 30906	Monthly financial statements	TAC management - NASA through 533M report	Financial records	Totals of financial records	Prior month financial statement, UNM detail transaction record current month financial records

PRODUCTS OR WORK ITEMS - PART 1

OFFICE ITEM NO.	PRODUCT	DELIVERED TO	STIMULUS	INFORMATION REQUIRED	SOURCE
COSMIC 31001	Computer Program (purchase)	Clients(including NASA Centers & NASA Contractors)	Purchase Order or TU Request	Our records require only a flash sheet number to pull program from Library unless some unusual format is required.	Order
COSMIC 31002	Computer Program (Lease)	Clients(including NASA Centers & NASA Contractors)	Purchase Order and Signed Lease Agreement or TU Request	Our records require only a flash sheet number to pull program from Library unless some unusual format is required.	Order
COSMIC 31003	Documentation (including catalog)	Clients(including NASA Centers & NASA Contractors)	Purchase Order or Request from TU Offices	Our records require only a flash sheet number to pull program from Library unless some unusual format is required.	Order
COSMIC 31004	Monthly Status Report	NASA Technical Officer, NASA Contracting Officer, ONR Resident Rep., NASA STIF, NASA TU Offficers	Contract requirement	Activities report, product submitted, sales information, new abstracts, benefits reports, cost schedules, etc.	Local office plus NASTRAN maintenance subcontractor
COSMIC 31005	Annual Progress Report	NASA Technical Officer, NASA Contract Officer, ONR Resident Representative, NASA STIF, TU Officers	Contract requirement	Activities report, product submitted, sales information, new abstracts, benefits reports, cost schedules, etc.	Local office plus NASTRAN maintenance subcontractor
COSMIC 31006	Small Business Semi-annual Report	HWE-2	Contract Obligation	Dollar Value of Purchases vs. Status of Vendor	University Status Report and Vendor Information

PRODUCTS OR WORK ITEMS - PART 1

OFFICE ITEM NO.	PRODUCT	DELIVERED TO	STIMULUS	INFORMATION REQUIRED	SOURCE
COSMIC 31007	Small Business Quarterly Report	HM-1	Contract Obligation	Dollar Value of Purchases vs. Status of Vendor	University Status Report and Vendor Information
COSMIC 31008	Promotional Material	Clients and Potential Clients	Stimulate sales of software	Technical data about program	Technical Document
COSMIC 31009	Benefits Reports	-NASA HQ (Monthly Report) -Customer submitting the report -STIF for incorporation into SPINOFF	Contract Obligation	How a customer utilizes a NASA program in a non-aerospace application	Customer
COSMIC 31010	NASTRAN Maintenance Progress Report	NAG members monthly	Request by members	Status of NASTRAN Maintenance	Maintenance Contractors and COSMIC's Staff
COSMIC 31011	Monthly Report - TU Officers	Technical Utilization Officers	Contract	New abstracts, IR, original Tech Briefs, copy of Form 666	COSMIC C/MR System
COSMIC 31012	Monthly Report - STAC/IAC Directors	STAC/IAC Directors	Contract	Copies of new released abstracts	Technical/Marketing Staff
STIF 31401	Letter response	Requestor	NASA policy and guidelines	NASA TU documents, NASA technology, reports, references	Available TU documents and services
STIF 31402	Technical Support Packages (TSPs)	Requestor	NASA Policy and Guidelines	TSPs supporting specific NASA Tech Briefs	File of master copies of TSPs
STIF 31403	NASA's Annual TU Report SPINOFF	NASA Headquarters	NASA requirement	Use, transfer, application of NASA developed technology	TSP follow-up, clippings, research

PRODUCTS OR WORK ITEMS - PART 1

OFFICE ITEM NO.	PRODUCT	DELIVERED TO	STIMULUS	INFORMATION REQUIRED	SOURCE
ARC 31501	Quarterly reports	Headquarters	Avlt.	Activity records	Computer files
JSC 31701	Call for RTOP(s)	Director of Space Operations, Director of Research and Engineering, and Director for Center Support	NASA Headquarters requirement	NASA/Headquarters directive	NASA/Headquarters and directive
JSC 31702	Individual requests, either internal or external	General public, private industry, institutions, local contacts	Requests and inquiries	Subject, key words, author	Contract support and local
JSC 31703	Technical Support Packages	General public, private industry, institutions	Result of requests and inquiries	Subject matter, title, author	Local files and contract support
JSC 31704	NASA Spinoffs	General public, retirees and contract support within the JSC facility, distribution 8,000	A result of NASA Tech Briefs or Technology Utilization Transfer	In-house generated reports, R&D new technology disclosures	Submitting items to be included in Spinoff as per requested by NASA Headquarters
JSC 31705	Technology Utilization Office Weekly Report	Legal/Patent Office	Office procedure requirement	Highlights of weekly activity	Monitoring of day-to-day activity
JSC 31706	Evaluation of New Technology Disclosures	COSMIC or SRI International	NASA procedure	Complete disclosures	From new technology disclosures submitted
JSC 31707	NASA Tech Brief Awards	Sent to headquarters, Invention and Contribution Board	As a result of NASA Tech Briefs	Determined by the evaluation/classification	Disclosures submitted

PRODUCTS OR WORK ITEMS - PART 1

OFFICE ITEM NO.	PRODUCT	DELIVERED TO	STIMULUS	INFORMATION REQUIRED	SOURCE
JSC 31708	NASA Quarterly Reports	NASA Headquarters	NASA procedure requirements	Reportable items received and evaluated, Tech Briefs published, TSPs, number of inquiries and contracts with new technology clause status.	Local office files
JSC 31709	NASA Tech Briefs	General public, retirees, contract support within the JSC facility. Distribution undetermined.***	In-house generated report, R&D new technology disclosures.	In-house generated reports, R&D new technology disclosures	Submitted items to LTS for preparation of tech briefs
KSC 31801	Project Plans	NASA Headquarters	Headquarters requirement	Project schedule, cost projections, technical approach, user cooperation	Project Engineer, contractor, cooperators, etc.
KSC 31802	Quarterly Report	NASA Headquarters	Headquarters requirement	Status of New Technology Reports, contracts, projects, etc.	Local files
KSC 31803	Financial Report (Monthly)	Local TU Office	Management Need	Status of funds by project	Center financial records, local files
KSC 31804	RTOPs	NASA Headquarters	Headquarters' procedure	Project descriptions, funding requirements.	Project Engineer, contractors, users, etc.
LARC 31901	Correspondence to administer "New Technology" Clause	Contractor and/or Center personnel	Federal Acquisition Regulation, NASA FAR Supp., Directive 84-1, 18-27.375-3, "Follow-Up, Government"	"New Technology" Clause of contract	Contract file

PRODUCTS OR WORK ITEMS - PART 1

OFFICE ITEM NO.	PRODUCT	DELIVERED TO	STIMULUS	INFORMATION REQUIRED	SOURCE
LARC 31902	Evaluation of new technology items	SRI International, COSMIC, selected personnel at the Center	NASA procedure	Information describing the new technology	Author of the new technology item
LARC 31903	NASA Form 666, New Technology Transmittal	Center Patent Counsel, SRI International, COSMIC, Logical Technical Services Corporation.	NASA procedure.	New technology item title, innovators' names, employer, address, state of development, orgin, receipt data, date forwarded for evaluation, NT control number	Item reported and Center Patent Counsel for NT control number
LARC 31904	Transmittal letter with computer program	COSMIC	NASA NMI 2210,2A, "Distribution of NASA Computer Programs", December 23, 1982	NASA Form 666, computer program, and documentation	Letter from person supplying the program, often additional information obtained by telephone calls
LARC 31905	Draft Tech Brief	Logical Technical Services Corporation	NASA procedure	Technical description of the item, author, and employer	New technology item and NASA Form 666
LARC 31906	Monthly report for Tech Brief awards	NASA Headquarters Awards Branch	NASA procedure	NT control number, employer, title of item, innovator's name, innovator's home address, and innovator's Social Security number	New technology item and innovator
LARC 31907	Technical Support Package for a Tech Brief	NASA STIF	NASA policy	All the technical descriptive information available for the new technology item	New technology report and the innovator

PRODUCTS OR WORK ITEMS - PART 1

OFFICE ITEM NO.	PRODUCT	DELIVERED TO	STIMULUS	INFORMATION REQUIRED	SOURCE
LARC 31908	IR-100 Competition	IR-100 Competition Technical Publishing Company	Center policy	Technical description of new hardware or material, patent information and development cost	Developer of new technology
LARC 31909	Interagency Agreement	Other agency	NASA policy	Project title, scope of work, reports to be supplied, special equipment needed, estimated cost	Project technical person
LARC 31910	Research and Technology Objectives and Plans	NASA Headquarters	NASA procedure	Title, brief technical summary, justification, objectives, plans, approach, milestones, reporting, resource requirements, and Research and Technology Resume	Person planning the research, office files, Programs and Resources Division, and others as needed
LARC 31911	Project Plan	NASA Headquarters	NASA policy (NHB 7120.1)	Monthly budget of NASA technical, procurement, and contractor expenses Agency/manufacturer integration commercialization or Agency implementation management and reporting and cofunding plan yearly totals.	Technical personnel, outside Agency, or manufacturer

PRODUCTS OR WORK ITEMS - PART 1

OFFICE ITEM NO.	PRODUCT	DELIVERED TO	STIMULUS	INFORMATION REQUIRED	SOURCE
LARC 31912	Commitment and Obligation Plan	Programs and Resources Division at Center	NASA procedure	How the project funds are to be committed and obligated each month of the year	Technical personnel of project
LARC 31913	Input for Program Operating Plans	Program and Resources Division at Center	NASA procedure	Budgeting the next FY project funds	Research and Technology Objectives and Plans for next FY
LARC 31914	Quarterly Project Status Reports	NASA Headquarters and Center for Technology Applications, Research Triangle Institute	NASA procedure	For each project, a narrative of accomplishments, problems/changes, and plans for next quarter. Financial statement of funds committed, obligated, and costed.	Technical personnel and office records
LARC 31915	Prototype of hardware resulting from application project	Person or organization that will conduct evaluation	Normal procedure	Technology pertinent to the problem	Researchers at the LARC
LARC 31916	Answer requests for NASA technology	Requester outside NASA	Request by letter or telephone	Varies, but generally is one or more of the following: What has NASA done in the subject area? What published information is available? Who is the person that did the research?	Personal knowledge, conversations, literature searches

PRODUCTS OR WORK ITEMS - PART 1

OFFICE ITEM NO.	PRODUCT	DELIVERED TO	STIMULUS	INFORMATION REQUIRED	SOURCE
LARC 31917	Potential solution to problem statement	Technology Applications Team	Receive problem statement from Technology Application Team	Potential or known solutions to the stated problem	Personnel in the research Divisions
LARC 31918	Quarterly Technology Utilization Activity Report	NASA Headquarters	NASA procedure	Number of reportable items received, sent for evaluation, forwarded for Tech Brief publication requests for Technical Support Packages and other inquiries new contracts, certified compliance and active contracts.	Office records
MSFC 32101	MFS Number Master Log	Internal use	Internal TU Office Procedure	Reportable Item Data	Reportable item, SRI, NT Evaluation and Disposition Transcript, NASA Form 1370 and NT Publications Sign-off Form 1380
MSFC 32102	Reportable Item Record (File)	Internal use	TU Office Procedure	Reportable Item, NT Evaluation Disposition Form 1370, NT Publications Sign-off Form 1380	Reportable Item
MSFC 32103	New Technology Transmittal Form - NASA Form 666	Stanford Research Institute and COSMIC	NASA Procedure	Title of document, MFS number and innovator's names, contract number	Contractor or Civil Service Reportable Item

PRODUCTS OR WORK ITEMS - PART 1

OFFICE ITEM NO.	PRODUCT	DELIVERED TO	STIMULUS	INFORMATION REQUIRED	SOURCE
MSFC 32104	Tech Brief Index	Internal use	Technology Searches for Industrial and Public Sector	Brief technical description of technology	Tech Brief
MSFC 32105	Maintain Contract File	Internal use	TU Office Procedure	Basic contract, modifications, copies of correspondence, contractor's reports	Basic contract, modifications, copies of correspondence, contractor's reports
MSFC 32106	Maintain Space Act Award Program Data	Internal use	TU Office Procedure	Innovator's name, address, home address, social security number, case number & title of innovation, date submitted for award, date award sent to innovator	NASA Form 666, LTS/NASA Qtly Tech Brief publication list, innovator information form
MSFC 32107	Prepare Monthly Space Act Award Submission Form	NASA HQ (ICB)	NASA Procedure	MSFC case number & title, company name, innovator's name, home addresss, social security number	Letters to innovators w/ return information form, NASA Form 666
MSFC 32108	Prepare Space Act Awards Transmittal Correspondence	Award Recipients and Supervisors	NASA Procedure	Innovator's company/home address, title of innovation	Office files, NASA Form 666
MSFC 32109	Maintain "New Technology Contract Resume" cards for each contract - MSFC Form 3293	Internal use	TU Office Procedure	Contractor's name, address, period of performance, NT representative, reports submitted by contractor	Contracts(Basic), modifications, correspondence

PRODUCTS OR WORK ITEMS - PART 1

OFFICE ITEM NO.	PRODUCT	DELIVERED TO	STIMULUS	INFORMATION REQUIRED	SOURCE
MSFC 32110	Maintain "New Technology Management Information System" Contract Data Point	Internal use	TU Office Procedure	Contract number, company name and address, NT contact and phone number, award data, completion date, reports received	Contract(Basic), modifications, correspondence, incoming reports
MSFC 32111	Research and Technology Operating Plan (RTOP)	NASA Headquarters	Annual RTOP call from NASA Headquarters	Project plan information including resources on potential tech transfer of applications projects	MSFC laboratory scientists and engineer's reports, data, schedule, costs, manpower
MSFC 32112	A&PS Work Package	A&PS - AR01	A&PS Requirement	Employees' Job Description	TU Office File
MSFC 32113	Management Presentation Charts	Recipient of presentation	Management requirements for periodic presentations on TU activities	Data on Applications Projects, new tech reporting, Reportable Items, Space Act Awards and Tech Brief publications	Local office files
MSFC 32114	Technology Utilization Activity Report	NASA Headquarters (Qtrly)	NASA Requirement	Reportable Item records, TSP mailing data, NT clause records	Local office files
MSFC 32115	Prepare and Maintain Records Transfer Lists for Retired Contracts and Reportable Items (MSFC Fm 578)	Records Storage Area	NASA Procedure	Type or records stored, dates, disposition, contract or Reportable Item number	Local office files

PRODUCTS OR WORK ITEMS - PART 1

OFFICE ITEM NO.	PRODUCT	DELIVERED TO	STIMULUS	INFORMATION REQUIRED	SOURCE
MSFC 32116	Travel Projections	MSFC Plans & Analysis Office (AR01)	A&PS Procedure	Projected Quarterly and Annual Travel Requirements	Required attendance at TU meetings and key project reviews, MSFC Travel Office (cost estimates)
JPL 32201	Tech. Utilization Services Group Monthly Report	Manager Office of Patents and Technology Utilization, and to NASA Resident Office	JPL records requirement, NASA requirement	Production record - TSPs YTD and Monthly Statistics RE TSPs in/out	TU services group files
SRI 32301	Evaluation reports	TUO at all NASA Centers	NASA procedure	Ratings, Identification Nos., titles, keywords	SRl, NASA CTRS

APPENDIX B4

PRODUCTS OR WORK ITEMS

PART 2

PRODUCTS OR WORK ITEMS - PART 2

OFFICE ITEM NO.	PRODUCT	PROCEDURE	READY FOR RELEASE	QUALITY MEASURES
ARAC 30101	Monthly Quarterly Financial Reports	Utilize SuperCalc program for project control evaluation using data from local paperwork, generate report on word processor and mail	When required information has been received and period of report is over	Comparison with local accounting records and figures
ARAC 30102	Technical Studies	Personal contact with client, database searches, telephone contacts, staff discussion, report written	When report is written corresponding documentation is received and report is edited by technical advisor	Evaluation and benefit questionnaires are sent to all clients as to the quality of the reports received by them
ARAC 30103	Proposals	Salesmen's notes are analyzed by director of operations, database needs and time cost are calculated and written into a proposal of cost to client on word processor and mailed	When final proposal is written, typed and edited	Acceptance by client
FLSTAC 30201	Monthly status report, monthly contractor report, and NASA Quarterly Management Information Report	Access to computerized management information system and also insert data from local paperwork	When required information has been included	Timeliness, succinctness
FLSTAC 30202	NASA forms 294 & 295 (subcontractor reports) on Small and Small Disadvantaged Business Concerns	Insert data from printouts	When required information has been included	Timeliness, succinctness

PRODUCTS OR WORK ITEMS - PART 2

OFFICE ITEM NO.	PRODUCT	PROCEDURE	READY FOR RELEASE	QUALITY MEASURES
FLSTAC 30203	Technology transfer activities via use of NASA RECON database, Chemical Abstract, engineering. ***	Access computerized databases via computer terminals and retrieve appropriate data.	When required information has been included	Timeliness, succinctness, relevance
KIAC 30401	Literature Search	Assign control number, log the search, build a search strategy, conduct an on-line search, conduct a manual search, edit and organize the material, compose a letter that explains both the search contents and procedure.	The search is considered complete when the available sources have been tapped and, when the search process and search materials have been approved by the Director.	Formal evaluation process
KIAC 30402	Document Ordering	Log the request, select a supplier (NASA, STIF, NTIS, Commercial supplier), order, upon receipt invoice, ship.	When the document is received	Timeliness and delivery
KIAC 30403	Information and/or Referral	Contact the IAC Coordinator, check the files or appropriate source.	When information is obtained.	Timeliness, appropriate answer
KIAC 30404	Maintain KIAC Library	Reviewed, catalogued, and shelved		Organization
KIAC 30405	533-Q	Insert data from local paperwork	Preferably by the 10th of the month followoing the close of a quarter.	Accuracy, timeliness
KIAC 30406	MIR Quarterly	Gather data to be referenced, complete MIR for the quarter	As soon as computer print-outs and other information is provided. Preferably by the 10th of the month following the reporting quarter.	Accuracy, timeliness

PRODUCTS OR WORK ITEMS - PART 2

OFFICE ITEM NO.	PRODUCT	PROCEDURE	READY FOR RELEASE	QUALITY MEASURES
KIAC 30407	533-M	Access bookkeeper's monthly report and convert dollars to decimal figures, then utilizing this and the 533Q, complete the form for the current month.	When required information is provided by bookkeeper, preferably by the 10th of the month.	Accuracy and timeliness
KIAC 30408	Evaluation of searches performed	Type request letter and send an evaluation form to each client, non-respondants receive one follow-up letter.	At least one month followoing shipment of search or date of first follow-up letter.	Provide evidence of Mode 2 NASA technology transfer.
KIAC 30409	Quarterly Progress Report	Gather data and develop narrative and statistical report.	By the middle of the month following the quarter's closing date.	Timeliness, accuracy, sufficient data to show progress of KIAC in transfer of technology.
KIAC 30410	Preparation of Annual Application	Develop a proposal from information gathered	As indicated by NASA	To show prudent use of funds and quality service planned.
KIAC 30411	Annual Report	Develop a final narrative/statistical report	Within 30 days following close of contract	Accuracy, timeliness
KIAC 30412	Budget Control	Match each time on controller's report with receipts, itemize according to proper budget line item, enter in ledger develop according to budget.	When records are complete and monthly financial report is completed.	Accuracy
KIAC 30413	Monthly Financial Report	Prepare according to standard report form	When all information has been completed	Accuracy

PRODUCTS OR WORK ITEMS - PART 2

OFFICE ITEM NO.	PRODUCT	PROCEDURE	READY FOR RELEASE	QUALITY MEASURES
KIAC 30414	Monthly Marketing Report	Adm. Asst. completes information concerning mailing, benefit evaluations, and documents. Budget controller completes financial information utilizing monthly financial report.	When all sections of the report are complete and forms are typewritten.	Accuracy, timeliness
KIAC 30415	Monthly Salesperson's Reports	Run an appropriate computer program, complete information regarding total requests received, recap of paid searches and repeat searches, financial information (travel claims, commission, telephone expenses, and income)	After computer print-out is proofed and checked for accuracy, and all information is completed and typewritten	Accuracy, timeliness
KIAC 30416	Quarterly Summary	Sum totals of all expenses for each budget line item for previous three months, type, and deliver to appropriate staff.	When all information is complete and typewritten	Accuracy, timeliness
KIAC 30417	Purchasing	Contact vendor for item number and price, complete purchase order, deliver to Director for approval, send to purchasing for processing.	When approved and signed by Director	

PRODUCTS OR WORK ITEMS - PART 2

OFFICE ITEM NO.	PRODUCT	PROCEDURE	READY FOR RELEASE	QUALITY MEASURES
KIAC 30418	Invoices	Complete invoice form and prepare complete package for mailing	When invoice is completed	Accuracy
KIAC 30419	Payroll	Complete Payroll Authorization Form, deliver to Director for approval and signature, copy for financial records and deliver to Bursar's office for processing of payroll.	When all data is complete	Accuracy, timeliness
KIAC 30420	Travel Claims	Complete travel clain form, deliver to Director for approval and signature, copy for financial records, and deliver to Bursar's office for payment.	When all financial data is complete and Director has approved.	Accuracy
KIAC 30421	Daily Computer Entry of Client Data	Access computer files and input data from Search Request Form	When information has been entered into the computer, all updates have been done, and reports have been generated	Timeliness and accuracy
KIAC 30422	Preparing Completed Searches for mailing to client	Proof-read letter, type title page, bind search, and mail	After binding and putting into envelope	Accuracy and timeliness
KIAC 30423	Monthly Progress Report	Run designated computer program	After computer print-out is proofed and checked for accuracy.	Accuracy and timeliness
KIAC 30424	Monthly Benefit Letter Report	Run appropriate computer program	After computer print-out is proofed and checked for accuracy.	Accuracy and timeliness

PRODUCTS OR WORK ITEMS - PART 2

OFFICE ITEM NO.	PRODUCT	PROCEDURE	READY FOR RELEASE	QUALITY MEASURES
KIAC 30425	Monthly Management Report	Run appropriate computer program	After computer print-out is proofed and checked for accuracy	Timeliness and accuracy
KIAC 30426	Quarterly Completed Totals Report	Run appropriate computer program	After computer print-out is proofed and checked for accuracy	Accuracy and timeliness
KIAC 30427	Quarterly Search Characteristics Summary Report	Run appropriate computer program	After computer print-out is proofed and checked for accuracy.	Accuracy and timeliness
KIAC 30428	Quarterly Unduplicated Clients List Report	Run appropriate computer program	After computer print-out is proofed and checked for accuracy	Accuracy and timeliness
KIAC 30429	Quarterly Data Bases Used and Frequency Report	Run appropriate computer program	After computer print-out is proofed and checked for accuracy	Accuracy and timeliness
KIAC 30430	Quarterly Titles of Searches Completed Report	Run appropriate computer program	After computer print-out is proofed and checked for accuracy	Accuracy and timeliness
KIAC 30431	Monthly Backup of all Computer Accounts onto Magnetic Tape	Transfer all computer accounts onto magnetic tape using 'PIP' command.		Accuracy
KIAC 30432	Quarterly aviation Newsletter Publication	Newsletter is entered on the word processor, approved by the Director, corrections are made and the final copy is taken to printer. It is then collated, stapled, and address labels are affixed and mailed.	After letters are sorted and mailed.	Accuracy

PRODUCTS OR WORK ITEMS - PART 2

OFFICE ITEM NO.	PRODUCT	PROCEDURE	READY FOR RELEASE	QUALITY MEASURES
NCSTRC 30501	Documentation			
NCSTRC 30502	Retrospective search bibliographies	Online computer searching, receipt of abstracts by mail from vendors, review of retrieved material by information specialist. Review of completed, annotated bibliography by head of technical information section.	Upon review by information specialist, annotating and binding.	Determined by degree of relevance to question asked (in judgment of info specialist) and by feedback from client (usually in response to inquiry by STRC).
NCSTRC 30503	Current Awareness Profiles - Bibliographies	Regularly scheduled online computer searching, receipt of abstracts by mail from vendors. Depending on client instructions, scanning and review of output by information specialist, and/or preparation for mailing.	After review (if requested by client) or immediaytely upon receipt of abstracts by mail from vendor and preparation for mailing.	Determined by client reaction
NCSTRC 30504	Report on Special Projects (In-depth studies, compliations)	Online searching, manual searching and study telephone and personal contracts with subject experts analysis compilation construction of suggestions and recommendations identification of sources.	All available sources have been exhausted data has been reviewed and report written, draft has been reviewed by client and approved	Determined by relvancy of material produced client acceptance and degree to which it meets client's needs

PRODUCTS OR WORK ITEMS - PART 2

OFFICE ITEM NO.	PRODUCT	PROCEDURE	READY FOR RELEASE	QUALITY MEASURES
KYSTAC 30601	Mass Mailings and Marketing Information	Client information input into NASA/UK TAP MIS and word processing output of letters	When letters/brochures are printed	Response from new clients
KYSTAC 30602	Information search results	On-line interactive database searchng plus local office and library files	When sufficient information has been collected to enable client to solve problem	Timeliness/cost savings documented
KYSTAC 30603	Evaluation (Assessment of Benefits data)	Requests for evaluation are generated by NASA/UK TAP MIS and miled to client - Client completes and returns to NASA/UK TAP	Mailed 3-6 months after completion of search request	Completed form/returned form
KYSTAC 30604	Monthly Management Information Report	Com iled by Staff Assistant	When forms have been completed	Complelted forms
KYSTAC 30605	Spinoff contributions	Client contact based on evaluation request results - text prepared by NASA/UK TAP staff	Annually - When prompted by NASA Headquarters	NASA idea/product or signigicant problem solved
KYSTAC 30606	Annual Report	Statistical information complied and analyzed. Executire Summary written by Program Director	When all requirements are completed	Complete data
KYSTAC 30607	Technical Report to clients	In-house problem analysis, telephone information collection, on-line data base searching	When completed on word processor	Timeliness, completeness, response from client
NIAC/PGH 30701	Weekly and Monthly Finance Reports	Data gathered and entries made on micro files summary report generated on micro	When detailed information is posted	Internal review

PRODUCTS OR WORK ITEMS - PART 2

OFFICE ITEM NO.	PRODUCT	PROCEDURE	READY FOR RELEASE	QUALITY MEASURES
NIAC/PGH 30702	Weekly Production Report	Case reports and project folders collected and entries made to micro files summary reports generated on micro	When detailed information is posted	Internal review
NIAC/PGH 30703	NASA MIR Report	Information collected by administrator from production and finance manager finished report prepared	When complete data is collected	Timeliness, accuracy, completeness
NIAC/PGH 30704	Executive, management or decision support studies	Detailed review of client needs, access to data bases and other literature, review literature and compose expert analysis, generate finished package, deliver to client	When required materials are collected	Internal review and client satisfaction
NIAC/PGH 30705	1) Engineering and physical science studies 2) Environmental and health-related studies	Access data base, site visits of client groups, output review and report composition, lab work or external testing, if required, generate finished package and deliver to client	When required information and materials are collected	Internal review, client satisfaction
NIAC/PGH 30706	Information products	Phrasing with clients, access data bases, review output, formulate accompanying text, generate finished package, deliver to client	When required information is collected	Internal review, client satisfaction

PRODUCTS OR WORK ITEMS - PART 2

OFFICE ITEM NO.	PRODUCT	PROCEDURE	READY FOR RELEASE	QUALITY MEASURES
NIAC/USC 30801	Computer search package	Type citations online or print offline, gather all citations together, package, and mail	When all citations are received. Sometimes the citations are sent out piecemeal.	Comprehensiveness, pertinence, ease of understanding of printout format
NIAC/USC 30802	Quarterly and Annual Reports	Extract data from activity logs and cost records, insert into word-processor file, produce report and mail	Every 3 months, when all information has been gathered	Accuracy, completeness
NIAC/USC 30803	Tech Search Report	NIAC Tech Counselor makes contacts with experts in response to request from client/NIAC. He produces report and mails to NIAC. NIAC mails to client.	When all contacts have been made	Speed of response, appropriateness of experts for solution to problem
NIAC/USC 30804	Documents	Obtain documents from local libraries by messenger or use mail for interlibrary loan to distant libraries	When document is received at NIAC	Correct article, speed of response
NIAC/USC 30805	Information package	Mail to interested clients	As requested	Timeliness, completeness, design
NIAC/USC 30806	NIAC Retainer Contract	Mail or hand deliver to client who desires to establish a retainer account	When client requests	Legal strength
TAC 30901	Financial records	Weekly all sales invoices, pruchase requisitions, payroll, etc., are recorded and processed to produce monthly reports	Can be released daily or weekly we release totals monthly	Best available information

PRODUCTS OR WORK ITEMS - PART 2

OFFICE ITEM NO.	PRODUCT	PROCEDURE	READY FOR RELEASE	QUALITY MEASURES
TAC 30902	Maintaining product and service-oriented mailing lists	Enter address data on VAX 11/750	When needed	List is current
TAC 30903	Benefits reporting	Individual staff are responsible for maintaining contact with client and for formulation response	Whenever client releases new information, the form is revised	Best available information -- complete client history on one form
TAC 30904	Statistical Analyses	Once each year all TAC projects are totaled and reviewed in terms of the attached.	Upon demand	Up-to-date periodic historical
TAC 30905	Quarterly Reports, Monthly Information Reports (533)	TAC director accumulates material as it becomes available. At the end of the quarter, senior staff submits reports which are used to supplement and complete the task	January 10, April 10, July 10 and October 10 each year	Up-to-date, historical
TAC 30906	Monthly financial statements	Information from all accounts and categories compiled into a single monthly report on all contracts and into a financial statement	Midway through month following month of statement	Up-to-date with available information
COSMIC 31001	Computer Program (purchase)	Request entered into COSMIC Order System - part of program generates a work order for duplication of computer programs.	Check the computer print out with each program copied to be sure correct program is as copied - tape is not blank.	Timeliness to process order, lack of contact from clients with problems in using the product

PRODUCTS OR WORK ITEMS - PART 2

OFFICE ITEM NO.	PRODUCT	PROCEDURE	READY FOR RELEASE	QUALITY MEASURES
COSMIC 31002	Computer Program (Lease)	Request entered into COSMIC Order System - part of program generates a work order for duplication of computer programs.	Check the computer print out with each program copied to be sure correct program is as copied - tape is not blank.	Timeliness to process order, lack of contact from clients with problems in using the product.
COSMIC 31003	Documentation (including catalog)	Request entered into COSMIC Order System - part of program generates a work order for duplication of computer programs.	Check the computer print out with each program copied to be sure correct program was copied - tape is not blank.	Timeliness to process order, lack of contact from clients with problems in using the product.
COSMIC 31004	Monthly Status Report	Each technical area manager provides written reports to the Director based on records kept by machine or by hand - final copy is prepared on WP and multiple copies printed.	When all items are included and draft has been proofed	Value to NASA HQN and NASA TUO - not of particular value to COSMIC as the report is the status as of a date. This is usually not current enough for day to day decisions.
COSMIC 31005	Annual Progress Report	Each technical area manager provides written reports to the Director based on records kept by machine or by hand - final copy is prepared on WP and multiple copies printed.	When all items are included and draft has been proofed	Value to NASA HQN and NASA TUO - not of particular value to COSMIC as the report is the status as of a date. This is usually not current enough for day to day decisions.
COSMIC 31006	Small Business Semi-annual Report	Data Hand prepared, Key-punched, and run in a COSMIC prepared program	Review by director	No value to COSMIC
COSMIC 31007	Small Business Quarterly Report	Data Hand prepared, Key-punched, and run in a COSMIC prepared program	Review by director	No value to COSMIC

PRODUCTS OR WORK ITEMS - PART 2

OFFICE ITEM NO.	PRODUCT	PROCEDURE	READY FOR RELEASE	QUALITY MEASURES
COSMIC 31008	Promotional Material	Prepared by Marketing/Customer Service Staff	Reviewed by Technical Staff	High Value - used at trade shows and in response to engineers
COSMIC 31009	Benefits Reports	Contact by telephone - prepare report - acquire release from company	Signed release by company official	Value to COSMIC and to NASA
COSMIC 31010	NASTRAN Maintenance Progress Report	Modify the section in the monthly progress report on NASTRAN Maintenance.	Proofed and reviewed	Value to NAG - Keeps members cognizant of COSMIC activity
COSMIC 31011	Monthly Report - TU Officers	Prepared by technical staff - assembled by clerical staff	Review and sign by Director	Used by NASA TU Officers
COSMIC 31012	Monthly Report - STAC/IAC Directors	Collection of released abstracts prepared for each center	Cover letter signed	Value to Centers
STIF 31401	Letter response	Written response, hardcopy and reproduced documents, references developed from data base	Completion of written response with enclosures	Comprehensive
STIF 31402	Technical Support Packages (TSPs)	Reproduction and mailoccy	After publication of respective NASA Tech Brief journal	Good
STIF 31403	NASA's Annual TU Report SPINOFF	Development and determination of NASA tie-in, writing, photography, graphics, proof and review	Upon approval of camera-ready copy by NASA Hqs.	Outstanding
ARC 31501	Quarterly reports	Combine totals		

PRODUCTS OR WORK ITEMS - PART 2

OFFICE ITEM NO.	PRODUCT	PROCEDURE	READY FOR RELEASE	QUALITY MEASURES
JSC 31701	Call for RTOP(s)	General office, semi-annually	NA	NA
JSC 31702	Individual requests, either internal or external	NA	NA	NA
JSC 31703	Technical Support Packages	General office	NA	NA
JSC 31704	NASA Spinoffs	Determined by NASA Headquarters investigation and follow-ups	When published	Not judged from this office. Spinoff prepared by sub-contractor
JSC 31705	Technology Utilization Office Weekly Report	General office procedure	NA	NA
JSC 31706	Evaluation of New Technology Disclosures	General office procedure	NA	NA
JSC 31707	NASA Tech Brief Awards	Obtained from disclosure information	NA	NA
JSC 31708	NASA Quarterly Reports	General office procedure	NA	NA
JSC 31709	NASA Tech Briefs	Determined by in-house evaluation, patent office evaluation and Stanford Institute Research evaluation	When published	Determined by LTS
KSC 31801	Project Plans	Collect information from above sources, organize and type	When complete.	Comprehensive, complete.

PRODUCTS OR WORK ITEMS - PART 2

OFFICE ITEM NO.	PRODUCT	PROCEDURE	READY FOR RELEASE	QUALITY MEASURES
KSC 31802	Quarterly Report	Research local records, compile data, type and mail report.	When complete	Accuracy, completeness
KSC 31803	Financial Report (Monthly)	Get input from Center Financial Office - Supplement from local data - automate through Apple Lisa		Accuracy - Timeliness
KSC 31804	RTOPs	Manual preparation, typing from input collected from various sources	When complete.	Completeness
LARC 31901	Correspondence to administer "New Technology" Clause	Add information needed to complete a form letter stored in the word processor, mail to recipient, send a copy to other Center personnel as required by Center policy.	When required information is included	When information is recorded accurately.
LARC 31902	Evaluation of new technology items	Have technical evaluation made by one of the following SIR, COSMIC, or Center personnel. Review technical evaluation and make final publication decision	When decision to publish is made	Meets criteria for publishing
LARC 31903	NASA Form 666, New Technology Transmittal	Fill in blanks on form.	When necessary information is recorded	When information is recorded accurately

PRODUCTS OR WORK ITEMS - PART 2

OFFICE ITEM NO.	PRODUCT	PROCEDURE	READY FOR RELEASE	QUALITY MEASURES
LARC 31904	Transmittal letter with computer program	Fill out NASA Form 666 prepare letter using standard format on word processor	When letter is signed by author.	The letter is neat and proofread.
LARC 31905	Draft Tech Brief	Prepare a Purchase Request to have the draft written, a technical review made by Center personnel, and reviewed by Technology Utilization Office personnel. Transmit to Logical Technical Services corp. ***	When technically correct and edited by office personnel	Technically accurate
LARC 31906	Monthly report for Tech Brief awards	Obtain information from new technology item, or from innovator by telephone call or letter. Fill out NASA Form 1546, "Approved NASA Tech Briefs". Mail form to Awards Branch.	When have entered all information for the Tech Briefs approved for publication during 1 month	All information is entered accurately
LARC 31907	Technical Support Package for a Tech Brief	Prepare a Purchase Request to have the Technical Support Package written have the package technially edited by Center personnel. Mail the approved package to the NASA Scientific and Technical Information Facility.	After technical and office approval	Technically correct, complete, and neat.

PRODUCTS OR WORK ITEMS - PART 2

OFFICE ITEM NO.	PRODUCT	PROCEDURE	READY FOR RELEASE	QUALITY MEASURES
LARC 31908	IR-100 Competition	Fill out Entry Form using information supplied by developer and mail.	When form is completed.	Accurately recorded and submitted before competition closing data
LARC 31909	Interagency Agreement	Prepare forms required by the other Agency, obtain signature of authorizing official, and amil to other Agency.	When signed by authorizing official	Accurate
LARC 31910	Research and Technology Objectives and Plans	Collect the information from the various sources to complete NASA Forms 1471, 1471A, and 1471B. The completed forms are mailed to Headquarters.	When the forms are completed.	Completeness and accuracy.
LARC 31911	Project Plan	Allocate funds on form supplied	When funds are budgeted over the project period of performance	All project funds are allocated
LARC 31912	Commitment and Obligation Plan	Obtain estimation from technical personnel enter on a printed form the dollar values that are to be committed and/or obligated each month and any Purchase Requests over $20K.	When commitments and obligations equal the funds allocated for the year.	All project funds are allocated for the year.
LARC 31913	Input for Program Operating Plans	Obtain budget from Research and Technology objectives and Plans and enter values on a printed form.	When project funds are allocated.	Completeness
LARC 31914	Quarterly Project Status Reports	Obtain narrative from technical personnel. Use office records for financial statement. Type using a format stored on a word processor. Attach cover letter and mail to recipients.	When typed copy has all the required information	Accurate and complete.

PRODUCTS OR WORK ITEMS - PART 2

OFFICE ITEM NO.	PRODUCT	PROCEDURE	READY FOR RELEASE	QUALITY MEASURES
LARC 31915	Prototype of hardware resulting from application project	Either build it in-house or contract the fabrication out.	This is established arter the evaluation	This is established after the evaluation
LARC 31916	Answer requests for NASA technology	Obtain answer using personal knowledge, conversations, and/or literature searches. Either write letter or telephone the reply to the requester.	When an answer has been obtained to the request.	Have information that answers the request.
LARC 31917	Potential solution to problem statement	Send a copy of the problem statement to each Division to be circulated. Any responses are mailed to the Technology Application Team.	When a potential solution is received.	Typed description of the solution.
LARC 31918	Quarterly Technology Utilization Activity Report	Obtain inforamtion from office records. Record numerical information on NASA Form 1484. Using a word processor, type the narrative portion. Assemble and mail.	When in format requied.	Accurate and complete
MSFC 32101	MFS Number Master Log	Assign MFS number and track by dates, publishability classification of each Reportable Item from receival TROR publication.		Timeliness of Reportable Item processing

PRODUCTS OR WORK ITEMS - PART 2

OFFICE ITEM NO.	PRODUCT	PROCEDURE	READY FOR RELEASE	QUALITY MEASURES
MSFC 32102	Reportable Item Record (File)	Documentation is entered into folder as received or generated.		
MSFC 32103	New Technology Transmittal Form - NASA Form 666	Transfer data from Reportable Item to NASA form.	When required information has been included	Accuracy of data
MSFC 32104	Tech Brief Index	Enter data(Tech Brief title) on key punch forms.		Accuracy of data
MSFC 32105	Maintain Contract File	Prepare file folder for each new contract maintain file (incl. all correspondence, contract mods., reports).		Accuracy
MSFC 32106	Maintain Space Act Award Program Data	Data on all innovators are entered on individual 3x5 file cards.		Accuracy
MSFC 32107	Prepare Monthly Space Act Award Submission Form	Post information re Tech Brief innovators on NASA Form 1546 and submit form to HQTRS ICB.	When required information has been included	Timeliness, accuracy
MSFC 32108	Prepare Space Act Awards Transmittal Correspondence	Awards and certificates are transmitted via letter to innovators.	When awards and certificates are received from HDQTRS	Timeliness
MSFC 32109	Maintain "New Technology Contract Resume" cards for each contract - MSFC Form 3293	Prepare resume card for each new contract post all changes to contract on card.		Accuracy of data

PRODUCTS OR WORK ITEMS - PART 2

OFFICE ITEM NO.	PRODUCT	PROCEDURE	READY FOR RELEASE	QUALITY MEASURES
MSFC 32110	Maintain "New Technology Management Information System" Contract Data Point	Prepare computer input sheets (MSFC Form 3916) and submit sheets to keypunch		Timeliness and accuracy
MSFC 32111	Research and Technology Operating Plan (RTOP)	All data is entered on RTOP.	When required information has been included	Accuracy and inclusion of all information
MSFC 32112	A&PS Work Package	Access data on job descriptions and enter key duties in work package.	When required information has been included	Timeliness and accuracy
MSFC 32113	Management Presentation Charts	Enter information on view graph form.	As required	Accuracy of data
MSFC 32114	Technology Utilization Activity Report	Access local text and records - insert data on forms, monthly and quarterly.	When required information has been included	Timeliness and accuracy of data
MSFC 32115	Prepare and Maintain Records Transfer Lists for Retired Contracts and Reportable Items (MSFC Fm 578)	Data is entered on NASA Form 578 when completed files are ready for storage (semi-annually).	When files are completed	Accuracy
MSFC 32116	Travel Projections	Data is entered on A&PS form and submitted to Plans & Analysis Office.	When required information has been included	Succinctness
JPL 32201	Tech. Utilization Services Group Monthly Report	Access paper files and records, Type one-page statistical report mail to JPL and NASA offices	When statistics compiled	Timeliness Succinctness Lack of ambiguity Honesty

PRODUCTS OR WORK ITEMS - PART 2

OFFICE ITEM NO.	PRODUCT	PROCEDURE	READY FOR RELEASE	QUALITY MEASURES
SRI 32301	Evaluation reports	Evaluator knowledge & supportive lit.		Accuracy, succinctness

APPENDIX B5

PROBLEM AREAS

PROBLEM AREAS

OFFICE PROB NO.	KEY PRODUCT OR ITEM CAUSING PROBLEM	FEATURES OF THE PROBLEM
ARAC 40101	Downloading commercial data base abstracts to file storage	Baud rate for transmission
FLSTAC 40201	Production of reports for NASA and SUS Customer, Request, Trend Analysis	No Automated data base of request information from clients. Manual statistical analyses methods currently used. No computer equipment and software
FLSTAC 40202	Preparation of Bibliographic citation lists or full text of documents, reports, patents, etc.	Lack of computer equipment for downloading results and forwarding to area offices and/or clients
FLSTAC 40203	Electronic Mail	No computer system in-house - must contract through commercial systems
FLSTAC 40204	Trade Show/Conference demonstrations of STAC databases/information capabilities	Lack of portable microcomputer
KYSTAC 40301	Evaluation Responses	Client not returning form from 1st mailing, necessitating a second or third mailing
KIAC 40401	Document ordering	Documents are expensive, very difficult to find(too many possible sources), and delivery time is much too long (2 wks to 6 mos.) We need a centralized document ordering or information service

PROBLEM AREAS

OFFICE PROB NO.	KEY PRODUCT OR ITEM CAUSING PROBLEM	FEATURES OF THE PROBLEM
NCSTRC 40501	Production of In-House Work Orders	No central control of receiving incoming orders. Orders are received by any member of professional staff
NCSTRC 40502	Estimation of Prices for Orders Received	No central control of pricing. Pricing is done by any member of professional staff. A formula exists but is applied with the individual staff member's subjectivity
NCSTRC 40503	Document Procurement	The source for document(s) must be determined manually doc. order must be manually obtained and mailed from source. Elect. ordering capabilities would allev. slow turn-around time in doc. procuremnt
NCSTRC 40504	Service Activity by Clients	Data is filed in ind. file-per-client and is not nec. chronological. Reports and follow-up of client svcs. would be facilitated by ability to electronically refer to each client.
NCSTRC 40505	Data on Prospective Clients	No central system for storage of prospect data
NCSTRC 40506	LISTS - Mailing, Client, Prospects, Conference attendees, Workshops, etc.	Many lists (derived from varied sources) exist but are not merged and contain duplications

PROBLEM AREAS

OFFICE PROB NO.	KEY PRODUCT OR ITEM CAUSING PROBLEM	FEATURES OF THE PROBLEM
NIAC/PGH 40701	A lengthy text was provided in response to this form. See . . .	
NIAC/USC 40801	Computer Search Package	Citation format is difficult for clients to understand. Many duplicates if the search covered multiple data bases. Must use U. S. mail
NIAC/USC 40802	Quarterly and Annual Reports	Data must all be compiled manually
NIAC/USC 40803	Document delivery	There is often a long delay between date of order and fulfillment of order, due to slow mail, other interlibrary loan idiosyncracies
NIAC/USC 40804	Tech Search Report	Must rely on U. S. mail
TAC 40901	Unscheduled requests for contract information	The requests are never the same data requirements and formats differ each time - this form is a perfect example!
TAC 40902	Equip. to demonstrate state-of-the-art tech. in dig. image processing and geographic info. sys. dev.	Equipment upgrade would cost $125K
TAC 40903	Digital image data	Existing data acq. by NASA but are avail. to users from NOAA EROS Data Ctr. Clients often hesitant to purchase these data for TAC to process. Need telecomm. link to EDC for dir. access to raw data

PROBLEM AREAS

OFFICE PROB NO.	KEY PRODUCT OR ITEM CAUSING PROBLEM	FEATURES OF THE PROBLEM
COSMIC 41001	Searching collection for appropriate analysis of problem	Current search systems not fast enough or "helpful" for searching
COSMIC 41002	Market Analysis Information (Customer Information)	Data is available but not in a readily useable form for marketing to make their own analysis
STIF 41401	Reproduction of Technical Support Packages(TSPS)	Volume to be reproduced by XEROX 9400 presently. Volume ever increasing
ARC 41501	No Problems to Report	None
JSC 41701	"RTOP(s)"	Logistics...Resources...Availability of Funds...Schedules to Process RTOP(s)
JSC 41702	Properly Identifying the Function of the Technology Utilization Office by the General Public	Office needs better public understanding of the Technology Utilization Office... more exposure coupled with resources
JSC 41703	Tech Brief Publication and Dissemination for Technical Support Package related to the Tech Brief Pub	No consistent date when Tech Brief are to be published. Eliminate the "Seasons" which causes general public alarm when the next issue is to be available.
JSC 41704	Communication of information to outside as a result of Public Affairs Inquiries	When not to know what to do with a specific request, forward to the Technology Utilization Office for processing

PROBLEM AREAS

OFFICE PROB NO.	KEY PRODUCT OR ITEM CAUSING PROBLEM	FEATURES OF THE PROBLEM
KSC 41801	Quarterly Report	Time consuming - manual compilation of detailed data
KSC 41802	Financial Report	Financial data in Center tracking system not available in complete detail
LARC 41901	Monthly Report for Tech Brief awards	Obtaining the Social Security number and current home and business addresses of contractor employees
LARC 41902	Arrange Tech Brief award presentations	Time required to contact people for the award presentation and to verify who will attend
LARC 41903	Annual awards for individual and Division that contributed most to the Ctr Technology Ut. Program	Collecting the data used to rate individuals and Divisions
LARC 41904	Follow-up with requesters of technology to determine the benefits they derived (spinoffs)	Time to collect the information
LARC 41905	Applications Engineering Project	Time and effort to justify the project and obtain funding
MSFC 42101	NASA Tech Brief Key Word Index-ALFA - Numeric Computer Printout	A specific technology if an MFS number or exact title of technology is not known
JPL 42201	Monthly Report	Categories not adequately defined - leads to misinterpretation by uninitiated - misleading

PROBLEM AREAS

OFFICE PROB NO.	KEY PRODUCT OR ITEM CAUSING PROBLEM	FEATURES OF THE PROBLEM
JPL 42202	Search facility	Requires updating by dedicated person
JPL 42203	Contacting prospective licensees/transferees	Time consuming out of proportion to return
JPL 42204	Responding to requests for TSPs and information	Labels must be cut and pasted, from NASA HQ computer runs - system not automated
SRI 42301	Dissemination of Reports	No immediate awareness of misdirected reports
SRI 42302	Logging of Technical Report Descriptors	Duplication of effort

APPENDIX B6

HARDWARE/SOFTWARE SYSTEM CONFIGURATION

HARDWARE/SOFTWARE SYSTEM CONFIGURATION

OFFICE ITEM NO.	HARDWARE AND OPERATING SYSTEM	SOFTWARE INCLUDED WITH SYSTEM ADDITIONAL NOTES IN PARENTHESIS
ARAC 50101	VAX 11/780 VMS	Sortaid
ARAC 50102	HP 150 MS-DOS	PAM, Wordstar, BASIC, DSN/LINK
ARAC 50103	Zenith Z-150 PC-DOS	Knowledgeman
ARAC 50104	H89 CP/M	Reach, Wordstar, Supercalc
ARAC 50105	IBM PC PC-DOS	WordStar, Kermit
ARAC 50106	IBM PC/XT PC-DOS	WordStar, Kermit, Lotus 123,PC-Talk,Sidekick, STATPAK, VTERM, Fortran 77
ARAC 50107	TRS-80 Model III TRS-DOS	Visicalc, Profile, SuperScript, Videotex
FLSTAC 50201	Microcomputer System	On order
KYSTAC 50301	Hazeltine 1520	None
KYSTAC 50302	Osborne 01, Comm-Pac CPM-2.2	Wordstar, dBASE II, Supercalc 2, Amcall, a variety of common user software
KYSTAC 50303	Zenith 150 MS-DOS	WordStar, MITE (Addl H/W: 10 Mbyte hard disk)
KYSTAC 50304	Zenith Z-151 MS-DOS	WordPerfect
KYSTAC 50305	Data General DG-1 MS-DOS	SuperKey, Turbo Pascal, Crosstalk

HARDWARE/SOFTWARE SYSTEM CONFIGURATION

OFFICE ITEM NO.	HARDWARE AND OPERATING SYSTEM	SOFTWARE INCLUDED WITH SYSTEM ADDITIONAL NOTES IN PARENTHESIS
KIAC 50401	DEC PDP 11/70 RSTS/E	PASCAL, BASIC, COBOL, FORTRAN, ASSEMBLY
KIAC 50402	Eagle IIE CP/M	SPELLBINDER, ULTRACALC, CBASIC
KIAC 50403	TI 787	
NCSTRC 50501	IBM PC-XT PC-DOS 3.0	LOTUS 1-2-3
NCSTRC 50502	IBM PC PC-DOS 3.0	LOTUS 1-2-3
NCSTRC 50503	IBM PC PC-DOS 3.0	IBM Displaywrite 3
NIAC/PGH 50701	DEC 1099 TOPS 10 OS	FORTRAN, COBOL, 1022 DBMS, SPSS statistical package, TEL-A-GRAPH graphics package, UPDATE text editor, keypunch simulator, systems utilities
NIAC/PGH 50702	DEC Rainbow 100 MS-DOS	Multiplan spreadsheet, SELECT word processor, dBASE II DBMS, Daisy-Aids Graphics, MBASIC programming language
NIAC/PGH 50703	DEC VAX 8600 VMS	Fortran, Cobol, SAS, SAS-Graph, SPSS-K, 1032, System utilities
NIAC/USC 50801	IBM PC in LAN PC-DOS 2.1	Wordstar, Smartcom, Lotus 1, 2, 3, Superfile, Crosstalk, George, Sidekick, RBASE-5000 (Note: Hayes Smartmodem 1200, Okidata 84 printer, HP Thinkjet)
NIAC/USC 50802	ADDS Viewpoint 60 None	None (Note: Dumb terminal, Okidata 84 printer, Vadic VA212 autodial modem, Vadic 3451 Autoanswer modem, RISS configuration)
NIAC/USC 50803	Adds Viewpoint 60 None	None (Note: Dumb terminal, Okidata 92 printer, RISS configuration, Maxwell 4200v autodial modem, Maxwell 2400v autoanswer modem)

HARDWARE/SOFTWARE SYSTEM CONFIGURATION

OFFICE ITEM NO.	HARDWARE AND OPERATING SYSTEM	SOFTWARE INCLUDED WITH SYSTEM ADDITIONAL NOTES IN PARENTHESIS
NIAC/USC 50804	IBM PC/XT PC-DOS 2.1	Smartcom, Crosstalk, PC-Talk, George, Lotus 123, WordStar, Sidekick (Note: 2 Maxwell 2400v modems is RISS configuration for autodial and autoanswer, HP Thinkjet printer)
NIAC/USC 50805	Visual Commuter MS-DOS 2.1	WordStar, Lotus 123, Corsstalk, Smartcom
NIAC/USC 50806	DECwriter None	(Note: This is a Decwriter Correspondent dumb printing terminal, operating at 1200 bps)
TAC 50901	DEC VAX 11/750 VMS	NASA-ELAS, ESRI-ARC/INFO
TAC 50902	IBM PC PC-DOS	EasyWriter II, Visicalc, EasyFiler
TAC 50903	RIPS Baseline	RIPS/SPECDAT
COSMIC 51001	DEC VAX 11/780 VMS	FORTRAN, PL/I, DATATRIEVE, NASTRAN
COSMIC 51002	IBM PC PC-DOS, CP/M(?)	Various utility software, communications link software
COSMIC 51003	DECMATE II WPS	List processing, communications
COSMIC 51004	IBM 3081 MVS	All major compilers, utilities, in-house developed software for accounting and distribution of NASA software, NASA Software Library, Program Abstract Database
COSMIC 51005	CYBER 205	None
COSMIC 51006	CYBER 170/750, 845 NOS	All major compilers, utilities, in-house developed software database search system

HARDWARE/SOFTWARE SYSTEM CONFIGURATION

OFFICE ITEM NO.	HARDWARE AND OPERATING SYSTEM	SOFTWARE INCLUDED WITH SYSTEM ADDITIONAL NOTES IN PARENTHESIS
COSMIC 51007	UNIVAC 1100/62 EXEC 8	All major compilers, utilities
STIF 51401	IBM 4341 & 4381 MVS Version 1 Release 3	TSO MARK IV, ADA Base
STIF 51403	IBM/PC PC/DOS	Symphony
STIF 51404	XEROX 860	Validator wordprocessor, Records processor, Generic programs
ARC 51501	ATV Jaquard J-100 System II	BASIC, Supersearch
JSC 51701	None	None
KSC 51801	Datapoint 8600 RMS/ARC 2.2	
KSC 51802	Apple Lisa Office Op Sys, Xenix Op Sys	Apple Lisa Software
KSC 51803	Apple MacIntosh MacIntosh Operating System	Most Apple MacIntosh Software
LARC 51901	NBI 3000 WP	Utility and Word Processing Diskettes
LARC 51902	IBM PC/AT PC-DOS	dBASE III, TIM 4, Volkswriter Deluxe, Lotus 123, Graphwriter, Diagraph, Prokey, dForm Letter, dUtil 3, Quickcode III, IBM 3101 Emulator (Addl H/W: Diablo 630 & Epson LQ1500 printers, HP 7475A plotter)
MSFC 52101	None	None

HARDWARE/SOFTWARE SYSTEM CONFIGURATION

OFFICE ITEM NO.	HARDWARE AND OPERATING SYSTEM	SOFTWARE INCLUDED WITH SYSTEM ADDITIONAL NOTES IN PARENTHESIS
JPL 52201	IBM PC PC-DOS	WordStar, Spellstar, dBASE II
SRI 52301	TRS-80 TRS-DOS	Profile, BASIC
SRI 52302	Hazeltine 1500	KL, ARPA NET, DEC 20

APPENDIX B7

COMMUNICATION SYSTEM CONFIGURATION

COMMUNICATION SYSTEM CONFIGURATION

OFFICE	ITEM NO.	COMMUNICATION LINK	FROM	DESTINATION	DATA RATE
ARAC	60101	Telephone with modem	DECWRITERS	IBM mainframes	1200
ARAC	60102	Hardwired Digital Telephone	Univac UTS400	NASA STIF computer	9600
ARAC	60103	Telephone with modem	DECWRITERS	IBM, DEC mainframes	1200
ARAC	60104	Telephone with modem	HP150, Z89, micros	HP150, Z89, micros	1200
FLSTAC	60201	TELENET	Hazeltine or Zenith	On-line data bases	300/1200
FLSTAC	60201	Telenet	STAC	Database vendors	1200
FLSTAC	60202	Tymnet	Hazeltine or Zenith	On-line data bases	300/1200
FLSTAC	60202	Tymnet	STAC	Database Vendors	1200
FLSTAC	60203	Cybernet	Hazeltine or Zenith	On-line data bases	300/1200
FLSTAC	60203	Uninet	STAC	Database Vendors	1200
FLSTAC	60204	Uninet	Hazeltine or Zenith	On-line data bases	300/1200
FLSTAC	60205	Telephone GTE	Office	World-wide	voice
KIAC	60401	Dial-up to all data bases	TI 787	Data bases	1200
KIAC	60402	Telephone			
NCSTRC	60501	Telephone	Terminal	Telenet,Tymnet,Unine	300/1200
NIAC/PGH	60701	Modem	Terminal	DEC 10	300
NIAC/PGH	60702	Modem	Terminal	DEC 10	300
NIAC/PGH	60703	Modem	Terminal	DEC 10/any dial-up	300

COMMUNICATION SYSTEM CONFIGURATION

OFFICE	ITEM NO.	COMMUNICATION LINK	FROM	DESTINATION	DATA RATE
NIAC/PGH	60704	7 acoustic couplers	Terminals	DEC 10 DIALOG	300
NIAC/PGH	60705	Modem	Micro	DEC 10/any dial-up	300/1200
NIAC/PGH	60706	Modem	Terminal	NASA/RECON	1200
NIAC/USC	60801	Computerized literature search	Hazeltine 1500	Various Mainframes	1200
NIAC/USC	60802	Computerized literature searching	Adds Viewpoint 60	Various mainframes	1200
NIAC/USC	60803	Remote interactive search service	Client equipment	Adds Viewpt 60/Vadic	1200
NIAC/USC	60804	Remote interactive search service	Client equipment	Hazelt 1500/Vadic	1200
NIAC/USC	60805	Remote interactive search service	Client equipment	IBM PC/Hayes Smtcom	1200
NIAC/USC	60806	Computer searching	IBM PC/Hayes Smtcom	Various mainframes	1200
NIAC/USC	60807	Elec mail/gateway comp search w/ TIS	IBM PC/Hazelt/Adds	Mainframes	
NIAC/USC	60808	Elec mail, gateway comp srch w/ Augment	IBM PC/Hazelt/Adds	Mainframe	1200
NIAC/USC	60809	LAN	IBM PC	IBM PC	
TAC	60901	TELEX	UNM Bookstore	Worldwide	
TAC	60902	FAX	NEICA	Anywhere comparible	
TAC	60903	Dataphone	TAC	NASA Recon, EDC	

COMMUNICATION SYSTEM CONFIGURATION

OFFICE	ITEM NO.	COMMUNICATION LINK	FROM	DESTINATION	DATA RATE
COSMIC	61001	Telephone dial-up	DECMATE II	IBM 3081,DEC VAX	1200
COSMIC	61002	Telephone dial-up	IBM PC	IBM 3081,CYBER,Univa	1200
COSMIC	61003	Telephone dial-up	dumb terminals	IBM 3081,CYBER,Univa	300/1200
STIF	61401	Telephone			
ARC	61501	Telephone with modem	Jaquard	Telemail	1200
ARC	61502	Telephone with modem	Jaquard	Recon	1200
ARC	61503	Telephone with modem	Jaquard	USC RISS	1200
JSC	61701	NASA Teleconferencing Network	Houston	Other NASA/Cont Off	
JSC	61702	NASA Facsimile Network	Houston	Other NASA/Cont Off	
JSC	61703	NASA Voice Teleconferencing Network	Houston	Other NASA/Cont Off	
JSC	61704	FTS(Federal Communication System)	Houston	Other NASA/Cont Off	
JSC	61705	Local Telephone Network	Houston	Other NASA/Cont Off	
KSC	61801	Telephone			
LARC	61901	Federal Telecommunications System	Center	All of United States	
MSFC	62101	Telephone			
JPL	62201	Telephone			

APPENDIX C

KEY FUNCTIONS

APPENDIX	TITLE
C1	FUNCTION DESCRIPTIONS FOR IACs/STACs
C2	FUNCTION DESCRIPTIONS FOR TUOs

APPENDIX C1

FUNCTION DESCRIPTIONS

FOR IACs/STACs

Function #: 1.0

Function: Perform literature search and technical research

Impetus: Client-supplied request (phone calls, letters, personal visits, sales representatives)

Input(s)	Source of Input(s)
Coordinated Search Strategy	Function 2.0
Coordinated Cost Constraints	Function 2.0
Client Identification	Function 2.0
Bibliographic Citations	Data Base Services
Search Costs	Data Base Services and Constraints
Technical Expert References	Consultants
"New Release" Citations	Consultants

Product(s)	Recipient(s) of Products
Edited Bibliographic Citations	Client
Verified Technical Experts	Client
Technical Report	Client
Search Development Record	Functions 2.0,5.0,6.0, 8.0

Function #: 2.0

Function: Prepare cost proposal

Impetus: Client request

Input(s)	Source of Input(s)
Problem Statement	Client
Cost Constraints	Client
Client Shipping/Billing Info.	Client
Search Development Records	Function 1.0

Product(s)	Recipient(s) of Products
Proposed Search Strategy	Client
Proposed Price Bid	Client
Client Identification	Function 1.0
Coordinated Search Strategy	Functions 1.0
Coordinated Cost Constraints	Function 1.0

Function #: 3.0

Function: Order and distribute documents

Impetus: Client request for copy(ies) of docuemnt(s)

Input(s)	Source of Input(s)
Client Identification	Client
Request for Document	Client
Document	Publication Vendor
Document invoice	Publication Vendor

Product(s)	Recipient(s) of Products
Document Order	Publication Vendor
Document	Client
Client Identification	Function 8.0
Client Document Invoice Information	Function 8.0

Function #: 4.0

Function: Prepare financial statements

Impetus: NASA budget calls, NASA Headquarters directives

Input(s)	Source of Input(s)
Approved Purchase Order	Function 7.0
Client Financial Records	Function 8.0
Financial Information	Finance Dept.

Product(s)	Recipient(s) of Products
Monthly Financial Report	Functions 9.0 and 5.0
Quarterly Financial Report	Functions 9.0 and 5.0
Yearly Financial Report	Functions 9.0 and 5.0

Function #: 5.0

Function: Prepare management information reports

Impetus: NASA Headquarters requirements, special requests

Input(s)	Source of Input(s)
Monthly Contractor Report	Contractor
Search Development Records	Function 1.0
Monthly/Quarterly/Yearly Financial Report	Function 4.0

Product(s)	Recipient(s) of Products
Monthly Benefit Letter Report	Function 9.0
Quarterly Data Bases Used Report	Function 9.0
Monthly/Quarterly Management Information Report	Function 9.0
Annual Report	Function 9.0
Monthly Sales Report	Function 9.0
Monthly Contractor Report	Function 9.0
Quarterly Management Report	Function 9.0

Function #: 6.0

Function: Marketing

Impetus: Need to acquire more work

Input(s)	Source of Input(s)
Search Development Records	Function 1.0
Membership Lists	List Brokers
Directories	List Brokers
State Commerce Dept. Listings	State Commerce Dept.

Product(s)	Recipient(s) of Products
Letters/Brochures	Potential Clients
Seminars/Demonstrations	

Function #: 7.0

Function: Develop purchase orders

Impetus: NASA policy

Input(s)	Source of Input(s)
Purchase Request	Employee
Vendor Information	Vendor
Item Number/Price	Vendor
Approved Purchase Order	Function 9.0

Product(s)	Recipient(s) of Products
RFQ	Vendor
Purchase Order	Function 9.0
Approved Purchase Order	Purchasing Dept. and Function 4.0

Function #: 8.0

Function: Invoicing

Impetus: NASA Policy

Input(s)	Source of Input(s)
Client Identification	Function 3.0
Client Document Invoice Information	Function 3.0
Search Development Record	Function 1.0
Payment	Client

Product(s)	Recipient(s) of Products
Invoice for Search or Publication	Client
Client Financial Records	Function 4.0

Function #: 9.0

Function: Review reports and forms

Impetus: NASA/organization policy

Input(s)	Source of Input(s)
Monthly Financial Report	Function 4.0
Quarterly Financial Report	Function 4.0
Yearly Financial Report	Function 4.0
Monthly Benefit Letter Report	Function 5.0
Quarterly Data Bases Used Report	Function 5.0
Monthly/Quarterly Management Information Report	Function 5.0
Annual Report	Function 5.0
Monthly Sales Report	Function 5.0
Monthly Contractor Report	Function 5.0
Quarterly Management Report	Function 5.0
Travel Claim Form	Employee
Time Card	Employee
Purchase Order	Function 7.0

Product(s)	Recipient(s) of Products
Reports	NASA Headquarters
Approved Travel Claim form	Finance Dept.
Approved Time Card	Finance Dept.
Approved Purchase Order	Function 7.0

APPENDIX C2

FUNCTION DESCRIPTIONS

FOR TUOs

Function #: 21

Function: Administer New Technology Clauses in NASA contracts

Impetus: Federal Acquisition Regulation; NASA FAR Supplement 84-1,18-27.375-3, "Follow-up by Government"

Input	Source of Input(s)
"New Technology" Clause of Contract	Contract Files

Product(s)	Recipeint(s) of Products
"New Technology" Letter(s) to Contractor	Contractor
Copies of New Technology Letter(s)	NASA Management
Inputs to Status Reports	Function 26.0

Function #: 22

Function: Document New Technology and Applications

Impetus: NASA Policy on Distribution of New Technology; NASA NMI 2210.2A "Distribution of NASA Computer Programs"

Input	Source of Input(s)
Disclosure Forms	Innovator
New Technology Report	Innovator
Additional Information	Innovator
New Technology Evaluation	SRI International or COSMIC
Benefit Letter(s)	Recipient of NASA Information

Product(s)	Recipient(s) of Products
Draft Tech. Brief	Logical Technical Service Corp.
Recommended New Technology Item	- Center Patent Counsel - SRI International or COSMIC
Technical Support Package	- NASA Scientific and Technical Information Facility (STIF) - Local Files (Function 24.0)
Inputs to "NASA Spinoffs"	- NASA Headquarters
Competition Entry Forms	IR-100 Competition Technic Publishing Company
Inputs to Status Reports	Function 26.0

Function #: 23

Function: Administer New Technology Awards Program

Impetus: NASA Policy

Input	Source of Input(s)
Disclosure Forms	Innovator (via Function 22.0)

Product(s)	Recipient(s) of Products
NASA Tech. Brief Award Nominations	NASA HQ Innovator & Contribution Board
Inputs to Status Reports	Function 26.0

Function #: 24

Function: Respond to requests for NASA Technology Information

Impetus: Requests from sources within or outside NASA

Input	Source of Input(s)
NASA Tech. Briefs	Document Contractor
Personal Knowledge	NASA Technical Personnel
Literature Searches	NASA Library
Requests for Technology Information	Requestor
Requests for Distribution of TSPs	NASA HQ

Product(s)	Recipient(s) of Products
NASA Tech. Briefs	General Public Requestors
Technical Support Packages	Requestor
Potential Solutions to Problem Statements	Requestor and Technology Applications Team
Requests for Literature Searches	NASA Library
Inputs to Status Reports	Function 26.0

Function #: 25

Function: Plan/Manage Budgets and Projects within the TUOs

Impetus: NASA HQ Directives, NASA Budget Calls
NASA Policy, NHB 7120.1

Input	Source of Input(s)
Present Budget Info.	Previous POPs
Detailed Project Spending Plan	TUO Project Personnel (Function 27.0)
Financial Information	Center Resources Personnel

Product(s)	Recipient(s) of Products
Input to NASA Program Operating Plans	NASA Field Center Management and NASA HQ
Commitment & Obligation Plan	Center Programs & Resources Division
Project Plan(s)	Center Management and NASA HQ
Research & Technology Objectives & Plans	NASA HQ

Function #: 26

Function: Prepare Periodic Status/Progress Reports

Impetus: NASA Policy, NASA HQ Requirements, Special Requests

Input	Source of Input(s)
Inputs to Status Reports	Functions 21.0, 22.0, 23. 24.0, 25.0, 27.

Product(s)	Recipient(s) of Products
NASA Quarterly Report	NASA HQ
TUO Weekly Report	Center Legal/Patent Offic
Quarterly Project Status Reports	NASA HQ and NCSTRC
Monthly Report for Tech. Brief Awards	NASA HQ Award Branch

Function #: 27

Function: Special Activities

Impetus:

Input	Source of Input(s)
Project Description	NON-TUO Project Personnel
Technology Pertinent to the Prototype	NASA Researchers

Product(s)	Recipient(s) of Products
Interagency Agreement	Outside Agency
Prototype for Evaluation	Organization Performing Evaluation

APPENDIX D

DATA DICTIONARY

APPENDIX	TITLE
D1	DATA FLOWS FOR IACs/STACs
D2	EXTERNAL SOURCES/SINKS FOR IACs/STACs
D3	DATA FLOWS FOR TUOs
D4	EXTERNAL SOURCES/SINKS FOR TUOs

APPENDIX D1

DATA FLOWS FOR IACs/STACs

APPENDIX D1

DATA FLOWS FOR IACs/STACs

DATA FLOW	DESCRIPTION
PROBLEM STATEMENT	DESCRIPTION OF BIBLIOGRAPHIC SEARCH TOPIC OR AREA OF TECHNICAL EXPERTISE
COST CONSTRAINTS	MINIMUM/MAXIMUM BUDGET FOR A SPECIAL SEARCH TO BE DONE
CLIENT SHIPPING/BILLING INFORMATION	CLIENT'S NAME/ADDRESS/PHONE FOR TECHNICAL CONTACTS AND FOR BILLING CONTACTS, CLIENT'S PURCHASE ORDER INFORMATION
SEARCH DEVELOPMENT RECORD	CLIENT IDENTIFICATION + PROBLEM STATEMENT + COST CONSTRAINTS + COORDINATED SEARCH STRATEGY + COORDINATED COST CONSTRAINTS + BENEFITS + SEARCH COSTS
PROPOSED SEARCH STRATEGY	TECHNICAL SPECIALIST'S PROPOSED SEARCH STRATEGY, BASED ON THE CLIENT'S PROBLEM STATEMENT AND COST CONSTRAINTS, AND ON THE SPECIALIST'S KNOWLEDGE OF THE AVAILABLE DATABASES
PROPOSED PRICE BID	TECHNICAL SPECIALIST'S ESTIMATE FOR THE PROPOSED SEARCH STRATEGY
CLIENT IDENTIFICATION	INTERNAL VERSION OF CLIENT SHIPPING/BILLING INFORMATION
COORDINATED SEARCH STRATEGY	SEARCH STRATEGY COORDINATED BETWEEN CLIENT AND TECHNICAL SPECIALIST AFTER CLIENT'S RECEIPT OF PROPOSED SEARCH STRATEGY

APPENDIX D1

DATA FLOWS FOR IACs/STACs

DATA FLOW	DESCRIPTION
COORDINATED COST CONSTRAINTS	COST CONSTRAINTS COORDINATED BETWEEN CLIENT AND TECHNICAL SPECIALIST AFTER AGREEING UPON COORDINATED SEARCH STRATEGY
BIBLIOGRAPHIC CITATIONS	BIBLIOGRAPHIC ABSTRACT, AUTHOR, TITLE, SUBJECT KEYWORDS, DATE/LOCATION OF PUBLICATION. PUBLISHER OBTAINED FROM A DATABASE SERVICE. MAY OPTIONALLY INCLUDE "NEW RELEASE" CITATIONS.
SEARCH COSTS	COST OF PERFORMING DATABASE SEARCH VIA REMOTE ACCESS OR VIA LOCAL ACCESS OR THROUGH THE USE OF CONSULTANTS
TECHNICAL EXPERT REFERENCES	NAMES OF CURRENT EXPERTS IN A SPECIFIC FIELD
"NEW RELEASE" CITATIONS	BIBLIOGRAPHIC CITATIONS WHICH ARE SO CURRENT THAT THEY DO NOT APPEAR IN ANY OF THE "AUTOMATED" DATABASES
EDITED BIBLIOGRAPHIC CITATIONS	BIBLIOGRAPHIC CITATIONS AND "NEW RELEASE" CITATIONS (OPTIONALLY)
VERIFIED TECHNICAL EXPERTS	TECHNICAL EXPERT REFERENCES WHO HAVE AGREED TO CONSULT WITH THE CLIENT
REQUEST FOR DOCUMENT	CLIENT'S REQUEST FOR A COPY OF A DOCUMENT WHICH APPEARED ON THE LIST OF BIBLIOGRAPHIC CITATIONS
DOCUMENT	THE PUBLICATION WHICH IS SENT FROM THE PUBLICATION VENDOR TO THE IAC/STAC OFFICE AND THEN TO THE CLIENT

APPENDIX D1

DATA FLOWS FOR IACs/STACs

DATA FLOW	DESCRIPTION
DOCUMENT INVOICE	PUBLICATION VENDOR'S INVOICE FOR ANY DOCUMENTS SENT TO THE IAC/STAC OFFICE
DOCUMENT ORDER	ORDER FOR A PUBLICATION REQUESTED BY THE CLIENT
CLIENT DOCUMENT INVOICE INFO	DOCUMENT INVOICE INFORMATION, SORTED BY CLIENT
INVOICE FOR SEARCH OR PUBLICATION	INVOICE SENT TO THE CLIENT FOR ANY LIST OF BIBLIOGRAPHIC CITATIONS, LIST OF TECHNICAL EXPERTS, OR DOCUMENTS REQUESTED WHICH HAVE BEEN DELIVERED TO THE CLIENT, AND FOR WHICH PAYMENT HAS NOT BEEN RECEIVED
PAYMENT	CLIENT'S PAYMENT ON INVOICE FOR SEARCH OR PUBLICATION ORDER
PURCHASE REQUEST	REQUEST FOR ITEM TO BE PROCURED, BUDGET TO BE CHARGED, REQUESTOR NAME/LOCATION/PHONE, JUSTIFICATION
VENDOR INFORMATION	VENDOR NAME/ADDRESS/PHONE
ITEM NUMBER/PRICE	PRODUCT NUMBER AND VENDOR'S QUOTED PRICE IN RESPONSE TO RFQ
RFQ	REQUEST FOR QUOTE ON A SPECIFIC PRODUCT
PURCHASE ORDER	FORMAL PURCHASE REQUEST INCORPORATING VENDOR INFORMATION, ITEM NUMBER/PRICE, PURCHASE REQUEST

APPENDIX D1

DATA FLOWS FOR IACs/STACs

DATA FLOW	DESCRIPTION
APPROVED PURCHASE ORDER	PURCHASE ORDER WHICH HAS BEEN APPROVED BY MGMT.
CLIENT FINANCIAL RECORDS	CLIENT IDENTIFICATION, INVOICE FOR SEARCH OR PUBLICATION, RECORD OF PAYMENT RECEIVED
TIME CARD	EMPLOYEE NAME, TIME WORKED, DATES
APPROVED TIME CARD	TIME CARD WHICH HAS BEEN APPROVED BY MANAGEMENT
TRAVEL CLAIM FORM	EMPLOYEE IDENTIFICATION, EXPENSE DATES/TIMES/AMOUNTS, ACCOUNT TO BE CHARGED
APPROVED TRAVEL CLAIM FORM	TRAVEL CLAIM FORM WHICH HAS BEEN APPROVED BY MANAGEMENT
FINANCIAL INFORMATION	ALL INCOME AND EXPENSES; I.E., INVOICES FOR SEARCHES OR PUBLICATIONS, DOCUMENT INVOICES, PURCHASE REQUISITIONS, PAYROLL INFORMATION, ETC.
MONTHLY FINANCIAL REPORT	MONTHLY SUMMARY OF FINANCIAL INFORMATION
QUARTERLY FINANCIAL REPORT	QUARTERLY SUMMARY OF FINANCIAL INFORMATION
YEARLY FINANCIAL REPORT	YEARLY SUMMARY OF FINANCIAL INFORMATION
TECHNICAL REPORT	DOCUMENT CONTAINING RESEARCH MATERIALS AND ANALYSES

APPENDIX D1

DATA FLOWS FOR IACs/STACs

DATA FLOW	DESCRIPTION
MONTHLY CONTRACTOR REPORT	EXPENSE REPORT FROM A CONTRACTOR
BENEFITS	HOW SEARCH INFORMATION WAS USED BY CLIENT, HOW SATISFACTORY IT WAS, ANY NEW DEVELOPMENTS RESULTING FROM USING THE INFORMATION
MONTHLY BENEFIT LETTER REPORT	SUMMARY OF RESPONSES FROM FORMER CLIENTS DESCRIBING BENEFITS
QUARTERLY DATABASES USED REPORT	STATISTICS ON WHICH DATABASE SERVICES WERE USED, HOW FREQUENTLY, FOR WHAT TOPICS, AT WHAT COST
MONTHLY SALES REPORT	REPORT DESCRIBING MONTHLY SALES
MONTHLY/QUARTERLY MANAGEMENT INFORMATION REPORT	SEARCHES COMPLETED, NUMBER OF CLIENTS SERVED, SALES, WORK IN PROGRESS, CLIENT DEMOGRAPHIC DATA
ANNUAL REPORT	EXECUTIVE SUMMARY + YEARLY MANAGEMENT INFORMATION REPORT + BENEFITS
MEMBERSHIP LISTS	NAMES OF MEMBERS OF ORGANIZATIONS WHO ARE POTENTIAL CLIENTS
DIRECTORIES	TELEPHONE AND ORGANIZATIONAL DIRECTORIES CONTAINING POTENTIAL CLIENTS
STATE COMMERCE DEPT. LISTINGS	LISTINGS OF POTENTIAL CLIENTS

APPENDIX D1

DATA FLOWS FOR IACs/STACs

EXTERNAL SOURCE/SINK	DESCRIPTION
LETTERS/BROCHURES	PROMOTIONAL LITERATURE ADVERTISING BIBLIOGRAPHIC/ TECHNICAL EXPERT SEARCH SERVICES
SEMINARS/DEMOS	BRIEFINGS AND DEMONSTRATIONS ADVERTISING BIBLIOGRAPHIC/TECHNICAL EXPERT SEARCH SERVICES
REPORTS	ANY OF THE MANAGEMENT REPORTS PREPARED FOR OR FORWARDED TO NASA HEADQUARTERS (E.G., ANNUAL REPORT)

APPENDIX D2

EXTERNAL SOURCES/SINKS

FOR IASs/STACs

APPENDIX D2

EXTERNAL SOURCES/SINKS FOR IACs/STACs

CLIENT	ACADEMIC, COMMERCIAL, OR GOVERNMENTAL ORGANIZATIONS OR INDIVIDUALS
PUBLICATION VENDOR	LIBRARIES, NTIS, NASA/STIF, COMMERCIAL SUPPLIERS
DATABASE SERVICES	COMMERCIAL ELECTRONIC DATABASES, (E.G., NASA RECON, DoD, DoE)
CONSULTANTS	IN-HOUSE EXPERTS, COMMERCIAL/GOVERNMENTAL SPECIALISTS, TECHNICAL SPECIALISTS
LIST BROKERS	ANYONE WHO SUPPLIES LISTS OF POTENTIAL CLIENTS TO THE TU OFFICE
STATE COMMERCE DEPT.	THE COMMERCE DEPT, OF THE STATE, WHICH SUPPLIES LISTS OF POTENTIAL CLIENTS TO A STAC

APPENDIX D2

EXTERNAL SOURCES/SINKS FOR IACs/STACs

EXTERNAL SOURCE/SINK	DESCRIPTION
VENDOR	SUPPLIERS OF DOCUMENTS
PURCHASING DEPT.	HOST ORGANIZATION PURCHASING DEPARTMENT
EMPLOYEE	PERSONNEL IN TU OFFICE
FINANCE DEPT.	THE OFFICE IN THE HOST ORGANIZATION THAT HANDLES MONETARY MATTERS (E.G., THE UNIVERSITY BURSAR)
CONTRACTOR	AN OUTSIDE FIRM THAT PERFORMS SERVICES FOR THE TU OFFICE
NASA HQ	NASA HEADQUARTERS IN WASHINGTON, D.C.
POTENTIAL CLIENT(S)	INDIVIDUAL(S)/ORGANIZATION(S) WHO HAVE BEEN SELECTED AS POSSIBLE CLIENT(S)

APPENDIX D3

DATA FLOWS FOR TUOs

APPENDIX D3

DATA FLOWS FOR TUOs

DATA FLOW	DESCRIPTION
"NEW TECHNOLOGY" CLAUSE IN CONTRACTS	COPY OF CLAUSES IN NASA CONTRACTS RELATING TO THE REPORTING AND DOCUMENTING OF NEW TECHNOLOGY DEVELOPED UNDER THE CONTRACT
NEW TECHNOLOGY LETTER(S) TO CONTRACTOR	LETTER TO CONTRACTORS DESCRIBING MECHANICS AND CONTACT PERSONS FOR REPORTING NEW TECHNOLOGY
INPUTS TO STATUS REPORTS FROM FUNCTION 21	LISTS OF CONTRACTS CONTAINING NEW TECHNOLOGY CLAUSES AND CONTACTS WITH CONTRACTORS
DISCLOSURE	A SUMMARY DESCRIPTION OF INVENTION OR INNOVATION, PREPARED BY THE ORIGINATOR OF THE IDEA
NEW TECHNOLOGY REPORT (NTR)	FULL DESCRIPTION OF AN ITEM INCLUDED ON A DISCLOSURE FORM (THE NEW TECHNOLOGY REPORT IS USED TO SUPPORT ANY POTENTIAL PATENT APPLICATION OR PUBLICATION AS A TECH BRIEF).
ADDITIONAL INFORMATION	ADDITIONAL INFORMATION PROVIDED BY INNOVATOR IN RESPONSE TO QUESTIONS FROM TUO
NEW TECHNOLOGY EVALUATION	EVALUATION OF RECOMMENDED NEW TECHNOLOGY ITEM, WITH DECISION AND RATIONALE CONCERNING WHETHER TO PUBLISH IN NASA TECH BRIEFS OR COSMIC
BENEFITS LETTERS	LETTERS RETURNED BY RECIPIENTS OF NASA TECHNOLOGY, OUTLINING USEFULNESS AND SPECIFIC APPLICATION MADE OF THE TECHNOLOGY

APPENDIX D3

DATA FLOWS FOR TUOs

DATA FLOW	DESCRIPTION
DRAFT TECH BRIEF WITH NASA FORM 666	DRAFT VERSION OF A TECH BRIEF, SENT TO LOGICAL TECHNICAL SERVICES INCORPORATED (LTSI) FOR PREPARATION OF PUBLICATION COPY
RECOMMENDED NEW TECHNOLOGY ITEM WITH NASA FORM 666	POTENTIAL NEW TECHNOLOGY ITEM WHICH HAS BEEN RECOMMENDED BY TUO FOR PUBLICATION AS A TECH BRIEF. (THE RECOMMENDATION IS SUPPORTED BY DISCLOSURE FORMS AND OTHER DESCRIPTIVE MATERIAL WHICH WOULD BE INCLUDED IN A TECH BRIEF IF SELECTED FOR PUBLICATION.)
TECHNICAL SUPPORT PACKAGE (TSP)	COMPLETE DESCRIPTION OF A NEW TECHNOLOGY ITEM, GIVING MORE BACKGROUND, EXPLANITORY AND APPLICATION INFORMATION THAN IS CONTAINED IN A TECH BRIEF
INPUTS TO "NASA SPINOFFS"	DESCRIPTIONS OF SUCCESSFUL APPLICATIONS OF NASA TECHNOLOGY, RECOMMENDED FOR PUBLICATION IN "SPINOFFS"
COMPETITION ENTRY FORMS	FORMS FOR ENTERING THE IR-100 COMPETITION, SENT TO THE IR-100 COMPETITION TECHNICAL PUBLISHING COMPANY
INPUTS TO STATUS REPORTS FROM FUNCTION 22.0	LISTS OF: - DISCLOSURE FORMS AND NEW TECHNOLOGY REPORTS REPORTS RECEIVED, WITH THEIR STATUS IN BEING PROCESSED OR THE ULTIMATE DISPOSITION OF THE ITEM - ITEMS SENT TO SRI, COSMIC OR STIF

APPENDIX D3

DATA FLOWS FOR TUOs

DATA FLOW	DESCRIPTION
NASA TECH BRIEF AWARD NOMINATIONS	LISTS OF PERSONS RECOMMENDED TO RECEIVE AWARDS FOR PRODUCING NEW TECHNOLOGY ITEMS, WITH SUPPORTING RATIONALE
INPUTS TO STATUS REPORTS FROM FUNCTION 23.0	LISTS OF DISCLOSURE FORMS RECEIVED AND PERSONS NOMINATED FOR AWARDS, INCLUDING STATUS OF PREVIOUS RECOMMENDATIONS
NASA TECH BRIEF	DOCUMENT PUBLISHED QUARTERLY, CONTAINING SHORT DESCRIPTIONS OF ALL TECHNOLOGY ITEMS PREPARED FOR PUBLICATION DURING THE PAST THREE MONTHS. (THIS DOCUMENT IS GIVEN WIDE CIRCULATION TO POTENTIAL USERS OF NASA TECHNOLOGY.)
PERSONAL KNOWLEDGE	INFORMAL INPUTS FROM NASA PERSONNEL, PROVIDED IN RESPONSE TO REQUESTS FROM THE TUO, CONTAINING INFORMATION CONCERNING TECHNOLOGY ITEMS WHICH HAVE NOT YET BEEN FULLY DEVELOPED OR DOCUMENTED
LITERATURE SEARCHES	RESULTS OF A LITERATURE SEARCH PERFORMED BY A NASA LIBRARY, IDENTIFYING ALL AVAILABLE PUBLISHED MATERIAL COVERING A SPECIFIC TECHNICAL SUBJECT
REQUESTS FOR TECHNOLOGY INFORMATION	REQUESTS FOR TECHNOLOGY INFORMATION, RECEIVED DIRECTLY FROM THE INDIVIDUAL WANTING THE INFORMATION. (THESE REQUESTS MAY OFTEN BE SATISFIED BY SENDING A TECHNICAL SUPPORT PACKAGE ON A SPECIFIC APPLICATION, BUT MAY ALSO REQUIRE RESEARCHING THE STAUS OF ONGOING NASA PROJECTS OR THE COLLECTION OF PERSONAL KNOWLEDGE FROM NASA PERSONNEL.)

APPENDIX D3

DATA FLOWS FOR TUOs

DATA FLOW	DESCRIPTION
REQUESTS FOR DISTRIBUTION OF TSPs	LISTS OF PERSONS WHO HAVE REQUESTED SPECIFIC TECHNICAL PACKAGES, AND THE INFORMATION REQUESTED (THESE LISTS ARE PRODUCED FROM A COMPILATION OF NASA TECH BRIEF "BINGO CARDS".)
POTENTIAL SOLUTIONS TO PROBLEM STATEMENTS	RESULTS OF A TUO INVESTIGATION INTO A TECHNOLOGY PROBLEM, IDENTIFYING POTENTIAL SOLUTIONS DRAWN FROM EXISTING TSPs, PERSONAL KNOWLEDGE OBTAINED FROM NASA TECHNICAL PERSONNEL, OR LITERATURE SEARCHES
REQUESTS FOR LITERATURE SEARCHES	REQUESTS TO THE NASA LIBRARY FOR SEARCHES OF TECHNICAL LITERATURE, LOOKING FOR INFORMATION RELATING TO PARTICULAR SUBJECT
INPUTS TO STATUS REPORTS FROM FUNCTION 24.0	LISTS OF REQUESTS RECEIVED AND INFORMATION DISTRIBUTED, REQUESTS STILL WAITING ANSWERS, AND RELATED INFORMATION
NASA QUARTERLY REPORT	REPORT SUBMITTED TO NASA HQ EVERY THREE MONTHS, WITH NASA FORM 1484, DOCUMENTING THE PAST QUARTER ACTIVITIES OF THE TUO
TUO WEEKLY REPORT	REPORT SUBMITTED WEEKLY BY THE TUO, DOCUMENTING ACTIVITIES OF THE PAST WEEK AND DEFINING ANY ISSUES WHICH SHOULD COME TO THE ATTENTION OF CENTER MANAGEMENT

APPENDIX D3

DATA FLOWS FOR TUOs

DATA FLOW	DESCRIPTION
QUARTERLY PROJECT STATUS REPORTS	REPORT PREPARED EVERY THREE MONTHS, DOCUMENTING WORK PERFORMED ON A SPECIAL TUO PROJECT
MONTHLY REPORT FOR TECH BRIEF AWARDS	MONTHLY STATUS OF NOMINATIONS FOR TECH BRIEF AWARDS, AND STATUS OF PAST NOMINEES AWAITING RECEIPT OF AWARDS
PRESENT BUDGET INFO	BUDGET AMOUNTS OF DOLLARS AVAILABLE FOR ONGOING PROJECTS WHICH HAVE BEEN APPROVED FOR USE, ARRAIGNED BY JOB ORDER NUMBER AND CALENDAR DATE
DETAILED PROJECT SPENDING PLAN	DETAILS OF AMOUNTS, CONTRACTS, PURPOSES AND DATES FOR ALL PLANNED PROJECT EXPENDITURES
FINANCIAL INFORMATION	AMOUNTS BUDGETED, PLANNED DATES FOR COMMITTMENTS AND OBLIGATIONS, AMOUNTS ALREADY SPENT, ETC.
INPUT TO NASA PROGRAM OPERATING PLANS	REQUESTED AMOUNTS TO BE INCLUDED IN FUTURE NASA BUDGETS
COMMITMENT AND OBLIGATION PLAN	PLANNED DATES FOR FUTURE PROCUREMENT ACTIVITY, LISTING THE COMMITMENT DATE (RELEASE OF RFP) AND OBLIGATION DATE (EFFECTIVE DATE OF CONTRACT).

APPENDIX D3

DATA FLOWS FOR TUOs

DATA FLOW	DESCRIPTION
PROJECT PLAN	DOCUMENT CONTAINING REQUIRED PROJECT PLANNING INFORMATION SUCH AS COST PLAN, TOP-LEVEL SCHEDULE, KEY PERSONNEL, FUNDING PLAN, ETC.
RESEARCH TECHNOLOGY OPERATING PLANS (RTOP)	DOCUMENT CONTAINING BREIF SUMMARY AND JUSTIFICATION, PROGRAM MILESTONES, RESOURCE REQUIREMENTS, ETC.
PROJECT DESCRIPTION	INFORMAL INPUT FROM TECHNICAL PERSONNEL, COVERING TECHNICAL INFORMATION TO BE INCLUDED IN PROJECT PLANNING DOCUMENTS
TECHNOLOGY PERTINENT TO THE PROTOTYPE	INFORMAL INPUT FROM NASA TECHNICAL PERSONNEL, PROVIDING TECHNOLOGY INFORMATION NEEDED TO CARRY OUT DEVELOPMENT OF THE PROTOTYPE

APPENDIX D3
DATA FLOWS FOR TUOs

DATA FLOW	DESCRIPTION
INTERAGENCY AGREEMENT	AGREEMENT BETWEEN NASA AND ANOTHER GOVERNMENT AGENCY, DOCUMENTING ITEMS OF MUTUAL CONCERN SUCH AS FUNDING OR MANAGEMENT AGREEMENTS CONCERNING MUTUAL PROJECTS
PROTOTYPE FOR EVALUATION	TECHNOLOGY ITEM, DEVELOPED BY A SPECIAL PROJECT INTO A POTENTIAL PRODUCT, INTENDED TO BE USED FOR EVALUATION TESTING
EVALUATION OF PATENTABILITY	EVALUATION RENDERED BY CENTER PATENT COUNSEL CONCERNING THE PATENTABILITY OF A NEW TECHNOLOGY ITEM
NEW TECHNOLOGY ITEM	DESCRIPTIVE MATERIAL, SUCH AS DISCLOSURE FORMS AND OTHER DESCRIPTIONS OF THE NEW TECHNOLOGY, REQUIRED TO MAKE A DETERMINATION OF PATENTABILITY.

APPENDIX D4

EXTERNAL SOURCES/SINKS

FOR TUOs

APPENDIX D4

EXTERNAL SOURCES/SINKS FOR TUOs

EXTERNAL SOURCE/SINK	DESCRIPTION
CENTER PATENT COUNSEL	LEGAL OFFICE AT EACH NASA FIELD CENTER, DEALING WITH ISSUES OF PATENTABILITY
REQUESTOR OF INFORMATION	PERSON OR ORGANIZATION REQUESTING TECHNOLOGY INFORMATION FROM NASA
NASA OR CONTRACTOR INNOVATOR	PERSON DEVELOPING NEW TECHNOLOGY ITEM
SRI OR COSMIC	TU TEAM WHICH EVALUATES; NEW TECHNOLOGY ITEMS - SRI NEW COMPUTER PROGRAMS - COSMIC
LTSI	LOGICAL TECHNICAL SERVICES INC., PUBLISHING CONTRACTOR FOR TECH BRIEFS
STIF	SCIENTIFIC AND TECHNICAL INFORMATION FACILITY

APPENDIX D4

EXTERNAL SOURCES/SINKS FOR TUOs

EXTERNAL SOURCE/SINK	DESCRIPTION
IR-100 PUB CORP	IR-100 PUBLISHING CORPORATION, PUBLISHER OF INDUSTRIAL RESEARCH
INVENTION & CONTRIBUTION BOARD	NASA HEADQUARTERS BOARD, RESPONSIBLE FOR DETERMINING INNOVATION AWARDS
NASA MANAGEMENT	NASA FIELD CENTER AND NASA HEADQUARTERS MANAGEMENT FUNCTIONS, RESPONSIBLE FOR MANAGEMENT OF TU FUNCTIONS
CONTRACTOR	NASA CONTRACTOR, PERFORMING ON A NASA CONTRACT WHICH HAS A NEW TECHNOLOGY CLAUSE
TECHNOLOGY APPLICATIONS TEAM	
PRINT CONTRACTOR	COMPANY WHO HOLDS A CONTRACT FOR PRINTING NASA TECH BRIEFS OR SPINOFFS
NASA HEADQUARTERS	VARIOUS NASA HEADQUARTERS ORGANIZATIONS

APPENDIX D4

EXTERNAL SOURCES/SINKS FOR TUOs

EXTERNAL SOURCE/SINK	DESCRIPTION
NASA HQ AWARDS BRANCH	ORGANIZATION AT NASA HEADQUARTERS
OTHER NASA TUOs	TECHNOLOGY UTILIZATION OFFICES AT OTHER NASA FIELD CENTERS
CENTER MANAGEMENT	MANAGEMENT OF EACH NASA FIELD CENTER
NASA TECHNICAL PERSONNEL	NASA PERSONNEL HAVING KNOWLEDGE RELATED TO NEW TECHNOLOGY ITEMS
NASA LIBRARY	LIBRARY LOCATED AT NASA FIELD CENTERS
GENERAL PUBLIC	PEOPLE HAVING NO SPECIFIC ASSOCIATION WITH NASA TECHNOLOGY UTILIZATION
PREVIOUS POPs	PREVIOUS ISSUED NASA BUDGETS (PROGRAM OPERATING PLANS)

APPENDIX D4

EXTERNAL SOURCES/SINKS FOR TUOs

EXTERNAL SOURCE/SINK	DESCRIPTION
CENTER RESOURCES PERSONNEL	PEOPLE AT NASA FIELD CENTERS WHO PERFORM ACCOUNTING AND BUDGETING FUNCTIONS
NON-TUO PROJECT PERSONNEL	PEOPLE WORKING ON TUO PROJECTS, BUT WHO ARE NOT PART OF THE TUO STAFF
OUTSIDE AGENCY	GOVERNMENT AGENCY OUTSIDE OF NASA
EXTERNAL ORGANIZATION	ORGANIZATION, EITHER INSIDE OR OUTSIDE NASA, WHICH WILL EVALUATE A PROTOTYPE ITEM INCORPORATING A NASA TECHNOLOGY APPLICATION